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The Rhagionidae of Madagascar* (Diptera)

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SYNOPSIS

This is the first comprehensive study of the Madagascar Rhagionidae. Two genera are recorded from the island, *Suragina* Walker and *Chrysopilus* Macquart. The former genus is represented by two species, *S. milloti* (Séguy) and *S. pauliani* n.sp. Twenty-seven new species of *Chrysopilus* are described: *griveaudi, andringitrensis, lemur, superbus, ankaratrae, kimoroensis, madecassus* (with nominate subspecies and ssp. *merinanus*), *betsileorum, sogai, clemendoti, ivontakae, cognatus, latipennis, keiseri, moramangensis, vespertinus, megacephalus, lokobiensis, sucini, indris, antongilensis, atricornis, nemoris, mutabilis, zanjensis, mundus, vadoni.*

The relationship between *Suragina, Atherix* Meigen and *Atrichops* Verrall is discussed; *Atrichops* is a distinct segregate of which *Heterosuragina* Nagatomi is a synonym, and *Atherix* and *Suragina* are seen as opposed extremes of a more or less continuous morphological gradient.

Some generic features of *Chrysopilus* are mentioned. *Leptipalpus* Rondani, *Macellopalpus* Bigot and *Heliomyia* Doleschall are accepted as synonyms, as well as *Sapporomyia* Szilády. The subgenera of *Chrysopilus* are discussed, and *Chrysopilodes* Frey is the only one that its considered to be well founded; the confused position regarding *Poppiusiella* Frey is described and remains unclarified. Attention is drawn to the use of the pleurotergal vestiture as a specific character in *Chrysopilus.*

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INTRODUCTION

This is the first extensive study published on the Rhagionidae of Madagascar. The only member of the family hitherto known from the island has been *Suragina milloti* (Séguy). Further material of that species is recorded below along with a new species of the

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same genus, and twenty-seven new species of *Chrysopilus* Macquart are described. The wealth of Madagascar species in the latter genus has previously been noted (Stuckenberg, 1960: 298).

This study is based partly on material collected by myself in Madagascar during December 1955 and January 1956, and November 1957 to April 1958. My two expeditions were subsidised by the South African Council for Scientific and Industrial Research, to which my sincere thanks are due. During my stay on the island I received assistance in many forms from the Institut Scientifique de Madagascar, for which I make grateful acknowledgement. Dr. F. Keiser† of the Naturhistorisches Museum (Basel) and Mrs. Keiser collected extensively in Madagascar during 1957 and 1958, and have favoured me with the loan of the rhagionid material they obtained. I have also had the privilege of studying the Rhagionidae in the collection of the Institut Scientifique. A small but interesting collection in the Musée Royal de l'Afrique Centrale was kindly loaned by Dr. P. Basilewsky.

The holotypes of most of the new species described below are deposited in the Museum National d'Histoire Naturelle, Paris; the exceptions are the holotypes of *Chrysopilus vadoni* n.sp. and *Chrysopilus antongilensis* n.sp. which are the property of the Musée Royal de l'Afrique Centrale in Tervuren. Sets of species as complete as the material allows have been deposited at the Institut Scientifique in Tananarive, the Naturhistorisches Museum in Basel, and the Natal Museum. Paratypes of some species are in the British Museum (N.H.).

This paper deals with only the taxonomy of the Rhagionidae. Remarks on the distribution and evolution of this family in Madagascar will be given in a subsequent paper which is to be devoted to a faunal study of the Tabanoidea of that island.

KEY TO GENERA OF RHAGIONIDAE IN MADAGASCAR

Tibial spurs 0·2·2; third antennal segment reniform or subreniform, with dorsal arista; palps two-segmented, apical segment pointed and bent in middle; ♀ cerci one-segmented; hypopygium large, exposed, with cerci prominently attached to hind margin of epandrium .. .. **Suragina** Walker

Tibial spurs 0·2·1; third antennal segment onion-shaped, with apical arista; palps blunt, one-segmented, straight; ♀ cerci two-segmented; hypopygium inconspicuous, at least partly retracted, its cerci partly withdrawn beneath epandrium .. .. **Chrysopilus** Macquart

Genus *Suragina* Walker

Suragina Walker, 1860, Proc. Linn. Soc. Lond. **4**: 110.

The separation of this genus from *Atherix* Meigen has been discussed in more recent years by Malloch (1932: 113), Nagatomi (1958: 55) and Stuckenberg (1960: 283). Malloch pointed out a number of characters by which species of *Suragina* might be distinguished from *Atherix ibis* (Fabr.) and *A.variegata* Walker, especially the presence of a spur at the apex of the hind coxa, narrower frons in the female, more anterior position of the ocelli, more rounded postnotum, absence of setulae on R_{4+5} and *Cu*, more slender body and brighter

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colouration in *Suragina*. Nagatomi accepted the distinctions pointed out by Malloch, but treated *Suragina* provisionally as a subgenus of *Atherix*, and described another subgenus, *Heterosuragina* (type, *Atherix fontinalis* Nagatomi). Stuckenberg indicated that in South Africa the local species of *Suragina* can be distinguished from endemic species referred to *Atherix* by the characters cited by Malloch, and also by the holoptic male head, bare frons and face, larger third antennal segment, proportionately much longer legs, very slender fore tibia and tarsus, and unequal development of the claws and pulvilli of the front legs in the male.

The status of *Atrichops* Verrall (1909), monotypic for the European species *Atherix crassipes* Meigen, has for long been uncertain. Verrall distinguished the genus by the narrow frons in both sexes, bare face and thickened hind legs. The only Madagascar rhagionid hitherto known was described in this genus, viz. *Atrichops milloti* Séguy (1951), but Séguy gave no reason why he preferred to use the name *Atrichops* despite considering the genus to be synonymous with *Suragina* (which has priority). However the position of *Atrichops* has recently been partially clarified. When Nagatomi (1958) described *Heterosuragina*, he mentioned that it might be the same as *Atrichops* in view of the bare parafacials and narrow face and frons. A comparative study of specimens of *Heterosuragina* which he kindly sent me and material of *Atrichops* loaned by the British Museum (N.H.) revealed that these taxa are synonymous, and the synonymy has recently been published by Nagatomi (1964). A better understanding of *Atrichops* is now possible through excellent studies of the adult and immature stages of the species that had been placed in *Heterosuragina* (Nagatomi, 1958, 1960, 1961a, 1961b, 1962). Briefly, *Atrichops* is characterised in the adult by a protruding process on the lower margin of the sclerite above the front coxa, the closeness of the antennae to one another, the frons of the female diverging towards the vertex, and the face being narrower than the frons. There are differences which may be characteristic for the larval stages as well (Nagatomi, 1961a). As thus defined, *Atrichops* seems a distinct, monophyletic segregate; its distribution is noteworthy, the species occurring in Western Europe and Japan, but comparable cases exist in a variety of other animal groups. Even though the difficulty as to whether *Atrichops* is a valid genus or only a subgenus is still unresolved, the name is not applicable to either of the Madagascar species, both of which belong to *Suragina*.

Doubt also attaches to the genus *Atherigia* Szilády (1934) which Nagatomi (1958: 55) placed in the synonymy of *Suragina* because he found that the Japanese species *Atherix satsumana* Matsumura, transferred to *Atherigia* by Szilády, has the characters of *Suragina*. Szilády cited no type species for *Atherigia*, so, as he included a fairly heterogenous assortment of species in it, the interpretation of this taxon could depend on which species is selected as generotype. For example, the first species in Szilády's key, *A.marginata* (Fabr.), is not a typical *Suragina*. In any case, in terms of Article 13(*b*) of the Code, the genus is invalidated by the lack of a designated type species.

The problem of the interrelationships of *Atherix*, *Suragina*, *Atrichops* and the tropical and subtropical American species that appear to belong to *Suragina* (Malloch, 1932: 114), can be solved only by a study of material from the whole range of the group. However it is possible at this stage to point to some of the difficulties involved. The principal one is the relationship between *Atherix* and *Suragina*. If *Atherix ibis*, the generotype, is compared with almost any tropical species of *Suragina*, it seems to be strikingly different in many characters; in general it will be observed that *ibis* is a stouter, more compact and hairy species, with shorter, stronger legs, smaller wings, duller colouration, enlarged basal antennal segment, wide parafacials, and no hind coxal spur, whereas the *Suragina* species is opposite in all these characters. However these species are at the opposed extremes of a remarkable morphological gradient, and intermediate species occur both north and south of the equator; *Atherix marginata*, for example, is such a one, and all the South African species hitherto considered as belonging to "*Atherix*" (Stuckenberg, 1960: 270) form a discrete intermediate group. It seems that in a temperate climate the "*Atherix*" type tends to appear, while in the tropics the "*Suragina*" type predominates, and in the intermediate warm-temperate parts transitional forms occur which may also range into the truly temperate climatic zones. An excellent example of the operation of these trends is provided by the two Madagascar species considered below; on this largely tropical island, the one species (*milloti*) seems to have a wide range in the lower and middle montane forest zones, and is morphologically in every way a "tropical" species, whereas the other (*pauliani*) is confined to higher altitudes on an isolated mountain *of recent age* standing back in the centre of the island from the escarpments that separate the central plateau from the eastern slopes. Apparently in response to the relatively temperate environment provided by the Ankaratra mountain, *pauliani* shows many "temperate" features, namely in being more compact, hairy, darker and duller, in having relatively shorter and thicker legs, smaller wings, reduced hind coxal spur, and a head structure showing the beginnings of convergence towards the *ibis* extreme, the male being dichoptic, the female with a broadened frons, the head in both sexes dorsoventrally a little compressed, the third antennal segment reduced and the basal one somewhat enlarged.

A further difficulty will be to ascertain whether typical *Suragina* and *Atherix* phenotypes are extremes in one very widespread group, or whether they diverged early in the phylogenetic history of the Rhagionidae and have since come to overlap morphologically, through convergence resulting from an ecological overlap following extensions of range in both the northern and southern hemispheres.

Only two species of *Suragina* are recorded below but it is reasonably certain that others occur in Madagascar. In South Africa larvae which presumably belong to species of this genus have been found in many localities where adults have never been obtained. The adults are remarkably elusive, even though they are usually common when they are present, and this may be due to a fairly short period of adult life in any one locality. Also, the adults seem to emerge at no one season of the year, but have been found in most of the southern Spring and Summer months as well as in the Autumn, and one Madagascar specimen has been taken in July. It is thus largely a matter of chance that they are found.

NOTES ON SPECIFIC CHARACTERS

Considerable variation often occurs in the colour pattern of the imago in *Suragina* (Stuckenberg, 1960: 284). This variation is of two kinds. In the first place, teneral and young specimens have paler, sometimes evanescent, body and wing markings; the cause of this variation usually is apparent, though in some specimens that are fully hardened but young the weakness of the pattern may be deceptive. Secondly, variable dark markings may be present on the abdomen due to drying of the contents; this is especially the case with fully mature specimens, and the dark markings so formed must be distinguished from the true integumental pattern.

Wing measurements given below were taken as follows: length, from tip to apex of notch between alula and squama; breadth, the shortest transverse distance across wing from intersection of $Cu+A$ on hind margin. The proportions of the legs in the different specimens are given relative to thorax length which is the midline distance from the anterior edge to the posterior margin of the mesonotum. The measurements are given in eyepiece micrometer units which if divided by 12·5 are converted to millimetres.

Key to Madagascar species of *Suragina* Walker

Antennae, palps and proboscis blackish. Mesonotum almost entirely blackish or blackish-brown, only humeral and post-alar calli contrasting dull orange. Third antennal segment slightly larger in ♀ than in ♂, dimorphism not very pronounced; basal antennal segment relatively large. Head dichoptic in ♂. Frons of ♀ relatively wide, black for almost entire length, greyish only in a narrow, transverse band at lower end. Conspicuous dark markings on abdominal tergites 1-5 .. .. **pauliani** n.sp.

Third antennal segment orange in ♀, dull orange-brown in ♂; palps and proboscis dull orange slightly tinged with brown. Third antennal segment very enlarged in ♀, much smaller in ♂, dimorphism pronounced; basal segment relatively small. Head holoptic in ♂. Frons of ♀ relatively narrow, black on upper tow-thirds only. Dark markings present on tergites 1-3 only, inconspicuous in ♀ .. .. **milloti** (Séguy)

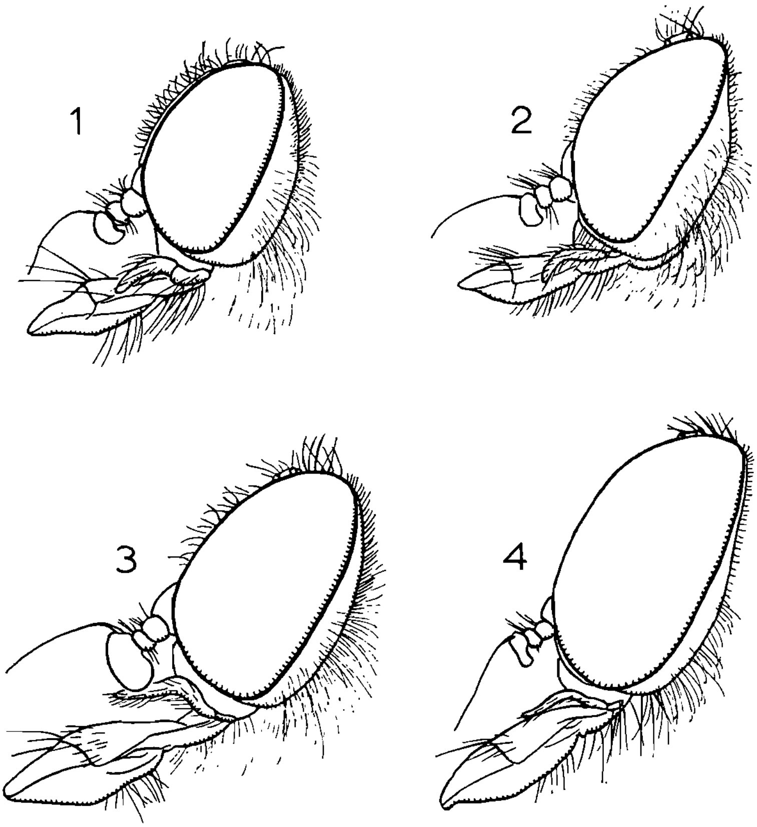
Suragina milloti (Séguy)

Atrichops milloti Séguy, 1951, Mém. Inst. sci. Madagas. (A) **6** (2): 395-6.

The type of this species is a male collected on the Tsaratanana Massif in the month of October. The specimens described below agree well enough with Séguy's description to be considered conspecific. One specimen, from Rogez in the eastern forest belt, differs a little in the colouring of the vestiture from the other specimens which all come from the northern part of the island, but it is unlikely that this difference has any significance other than slight geographical variation.

This species is easily distinguished from the next one by the characters given in the key; in comparison with *pauliani*, *milloti* is a larger, more elongate and bare species with proportionately longer legs and wings, brighter, predominantly reddish-brown colouring, well-defined stigma, and the head structure typical of tropical species of *Suragina*.

♂. Head (figs. 4, 7) in lateral view narrow, much longer in vertical axis than in longitudinal one; lower occiput only narrowly visible in lateral view. Eyes practically contiguous over most of length of frons, very narrowly separated by a dark brown, linear groove that extends from ocellar tubercle partway onto frontal area above antennae. Ocellar tubercle clearly visible in lateral view, ocelli quite large, arranged in narrow isoceles triangle; tubercle dark brownish-black, with long, dark brown, proclinate hairs. Frons elongate subtriangular above antennae, silvery ash-grey apart from dark, median groove on upper part. Antennae set very low; first segment subglobular, brownish in ground colour with brownish-grey pruinescence; second segment concolorous with first, almost as long but deeper; dark bristly hairs on upper side of first segment, and on upper and lower sides of second; third segment dull orange-brown, much reduced, vertically elongate, about 1½ times height of second segment, arista at dorsal extremity. Parafacials narrow, silvery-grey. Face relatively reduced, quite strongly retreating; its brownish ground colour overlain by greyish tomentum. Palps slender, tapering, angled at middle of second segment, dull orange-brown with greyish pruinescence and stiff, dark hairs. Proboscis dull orange-brown, with dark hairs. Occiput generally shining, silvery ash-grey, with two narrow, velvet-black marks bordering eye margins adjacent to vertex, a short postocular fringe of dark hairs on these marks.



Figs. 1-4: Lateral view of head; (1) *Suragina pauliani* n.sp. ♀ (2) *S. pauliani* ♂, (3) *S. milloti* Séguy ♀, (4) *S. milloti* ♂.

Thorax generally light brunneus, pleura more yellowed than mesonotum, humeri and scutellum pale yellow-brown. Mesonotum with irregular, brownish, median vitta and interrupted sublateral vittae, these apparently being attachment sites for flight muscles and not true surface colouring. Mesonotal hairs black except for some fine, pale brownish ones on humeri; on lateral parts of mesonotum the hairs are fairly long and bristly. Notopleural area with a patch of fairly thin, somewhat shifting, frosty, greyish pruinescence, contiguous with mesopleuron where there is thicker, more silvery-grey pruinescence. Mesopleural and propleural hairs fine and pale yellowish; hairs on dilated lower end of pleurotergite ("metapleuron") similar except on posterior portion where they are stronger and browner. Coxae clear yellowish lightly tinged with brown, all with some fine, pale yellowish hairs above and stronger, more bristly, dark ones at lower end. Fore and middle femora coloured like their coxae; posterior femora slightly widened apically, light brownish yellow, a brown band occupying approximately middle third, poorly defined basally. Tibia and tarsus of fore leg brownish, tarsus elongate, very slender, the proportions of the parts of one of the fore legs as follows:

Thorax length	*Femur length*	*Tibia length*	*Tarsomeres* 1	2	3	4	5
32	27	46	27	20	16	11	6

Claws very asymmetrical, outer one twice as large and strongly curved, outer pulvillus slightly larger; several series of fine touch hairs on lower surface. Middle tibia pale, translucent yellowish, tarsus similar but also somewhat brown-tinged, especially apically; tibial spurs unequal, posterior one only half length of anterior one. Posterior tarsus coloured like tibia, first tarsomere fairly stout, the others of much less length and thickness. Postscutellum reddish-brown.

Abdomen brunneus, second and third tergites narrowly blackened on lateral margins; a poorly defined, smoky-brown, median mark extends over first three tergites, on third tergite tapering strongly posteriorly then widening slightly along hind margin. Hypopygium brunneus, cerci blackish-brown. All tergal hairs black, sternal hairs pale yellowish-brown.

Wing as figured by Séguy, except that darkening at tip extends down margin to beginning of last posterior cell. Membrane shining greyish-hyaline with slight yellow tinge, yellow more pronounced in costal cell and at base of wing. Stigma dark brown, strong. Apex of costal and subcostal cells brown. A narrow, brownish band extends from stigma to base of fourth posterior cell,continuing more weakly into base of fifth and along apical part of *Cu* to hind margin. Apical part of wing with smoky-brown tinge, occupying large apical part of first submarginal cell, all but basal third of second submarginal, half of first posterior, all of second and third posterior cells, apex of fourth and small area in angle between M_4 and edge of wing. Also a poorly-defined brownish area near middle of first basal cell, and a less extensive, more interrupted diffusion, mostly confined along median and cubital veins, in second basal cell. Halteres dull yellowish-brown.

Body length, 9·0 mm.
Wing size, 9·0 x 2·9 mm.

♂ from Rogez: As above except in these respects: third antennal segment more reniform, and bright brownish-orange; all coxal hairs pale yellowish-brown; tergal hairs of abdomen black except on sides of tergites where they are pale yellowish-brown. Cerci blackish, conspicuously darker than remainder of hypopygium.

♀ Head as in figs. 3, 8, frons relatively narrow, at mid-point $\frac{1}{5\cdot7}$ - $\frac{1}{6\cdot4}$ of greatest transverse diameter of head, slightly convergent towards ocelli; upper two-thirds of frons velvet black, lower third dark, shining, lead grey. Ocellar tubercle dark brownish-black, front ocellus twice as large as posterior pair, ocelli in elongate isosceles triangle. Vertex silvery ash-grey. Black part of frons with numerous, irregularly disposed, stiff, dark brown hairs; stiffer, longer, erect, black hairs behind ocelli. First antennal segment subglobular, dark orange-brown with thinly overlying greyish pruinescence; second and third segments bright orange, second much shorter than first, third enlarged, reniform with dorsal arista. Palpi and proboscis orange tinged with brown, with black and dark brown hairs. Occiput whitish-grey with irregular velvety black marks above along eye margins, and a blackish, transverse mark above neck.

Thorax as in ♂, except all humeral and some notopleural hairs pale reddish-brown. All coxal hairs pale yellowish-brown. Fore legs with the parts in the proportions:

Thorax length	*Femur length*	*Tibia length*	*Tarsomeres* 1	2	3	4	5
30	27	29	24	17	13	8	5
33	29	41	24	17	14	9.5	5.5
31	28.5	41	25	16	13	9	5

Claws only slightly asymmetrical.

Abdomen brunneus, indistinct brown markings on first three tergites. Hairs mostly black except on sides of tergites where they are pale yellowish-brown.

Wings as in ♂, except for lack of brownish mark in basal cells, or at most there is a small, irregular clouding in first basal cell.

Body length, 9·5—9·7 mm.

Wing size, 8·5 x 3·1—9·1 x 3·0 mm.

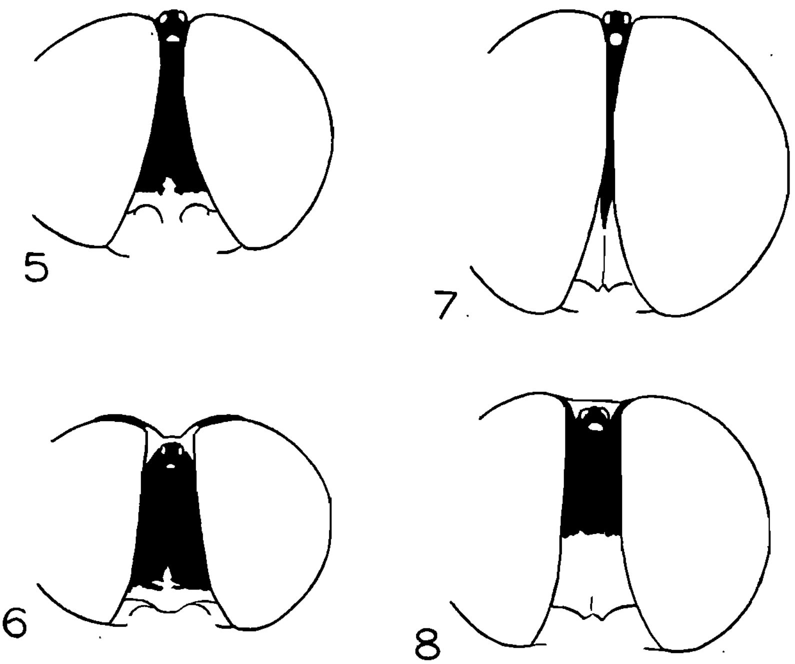
Material examined: Natal Museum—1 ♂ 3 ♀♀, Roussettes Forest Station, Montagne D'Ambre, 1000 m., 23.XI—4.XII.1958 (B. R. Stuckenberg); Institut Scientifique—1 ♀, Analamerana, 80 m., 50 km. S.E. Diego-Suarez, January 1959 (A. Robinson); Musée de l'Afrique Centrale—1 ♂, Rogez, east-central Madagascar, July 1937 (A. Seyrig).

Notes: The specimens from Roussettes Forest Station were observed sitting on the upper leaves of tall shrubs growing along a path on the bank of a fast, clear mountain stream. My attention was drawn to them when one of the females left her resting place and flew about my head as I walked past. Both sexes of this species constantly flicker the front tarsi over the substrate in front of them, in the manner noted in the South African species of *Suragina* (Stuckenberg, 1960: 284).

Suragina pauliani n.sp.

Distinguished from *milloti* by the characters given in the key; *pauliani* is a smaller, more compact and hairy species with relatively shorter legs, smaller wings, generally darker colouration, poorly defined stigma, and a head structure resembling that of some species occurring in temperate parts.

♂. Head (figs. 2, 5) in lateral view less elongate vertically, and proportionately longer in longitudinal axis, than in *milloti*. Lower half of occiput more extensively visible. Eyes distinctly separated, at closest (about at upper quarter of frons) separated by transverse diameter of anterior ocellus which is large; frons widening progressively towards antennae, velvety black except for narrow, transverse band above antennae, which is shining, dark greyish pruinose. Ocellar tubercle black, ocelli all rather large, anterior one larger than others. Black portion of frons with conspicuous, dark hairs which may be strongly arched forwards or erect with tips abruptly bent forwards; grey lower part of frons with pale yellow-brown hairs. Ocellar tubercle and vertex with quite long, dark hairs. Antennae uniformly blackish-brown with sparse, irregular, greyish pruinescence; first segment subglobular, longer than the others; second segment as long as third; third segment not much deeper than second, subreniform with dorsal arista; first segment above, second above and below, with dark hairs. Palps blackish with some very thin, greyish pruinescence, and blackish hairs. Mouthparts blackish or blackish-brown, with dark hairs. Face small, broader than high, blackish with shining, dark greyish pruinescence. Lower occiput and base of proboscis with long, pale straw-coloured hairs; sides of occiput with whitish hairs. Occiput mostly grey, an irregular, velvet-black mark present along each eye margin adjacent to vertex.



Figs. 5-8: Frontal view of head; (5) *Suragina pauliani* n.sp. ♂, (6) *S. pauliani* ♀, (7) *S. milloti* Séguy ♂, (8) *S. milloti* ♀.

Mesonotum blackish, moderately shining, humeral and postalar calli contrasting dull orange; thin, brownish-grey pruinose, sublateral vittae present, dilated towards humeri at anterior end, terminating posteriorly a short distance behind transverse sutures. Notopleural areas thinly greyish to reddish-grey pruinose. Scutellum dull orange-brown. Mesonotal and scutellar hairs mostly pale yellowish or whitish, a few isolated areas dark, a group on hind part of notopleuron dark, long and bristly. Membranous area above and below anterior thoracic spiracle dull orange, a brown area behind. Mesopleuron and sternopleuron blackish with thick, greyish pruinescence. Hypopleuron, sclerites below posterior thoracic spiracle, and anterior part of pteropleuron, dark brown with thin, dark greyish pruinescence. Posterior part of pteropleuron, all of metapleuron and sclerites around haltere, paler, mostly brownish with indefinite orange tinge. Terminal lower end of metapleuron with greyish pruinescence and fine, pale hairs. Postscutellum blackish. Mesopleural and propleural hairs pale yellowish or whitish. Fore and hind coxae brownish-yellow, darkened on anterior faces; middle coxae dark brownish with thin greyish pruinescence. All coxal hairs shining, pale yellowish or whitish. Fore and middle tibiae light yellowish-brown, tarsi brownish; fore tarsi slender and elongate, sections of fore legs in following proportions:

Thorax length	*Femur length*	*Tibia length*	*Tarsomere length* 1	2	3	4	5
26	22	33	16	10	7	5	4·5
26	22	34	17	10	7	5	4·5
25	20	31	15	9	7	4·5	3·75

Claws very unequal, outer claw much larger and flattened, pulvillus strap-like; series of touch hairs present, but not as long as in *milloti.* Tibia and tarsus of hind leg dark brown, basal third of tibia yellowed. Tibial spurs subequal on hind legs, unequal on middle pair, posterior spur less than half size of anterior spur.

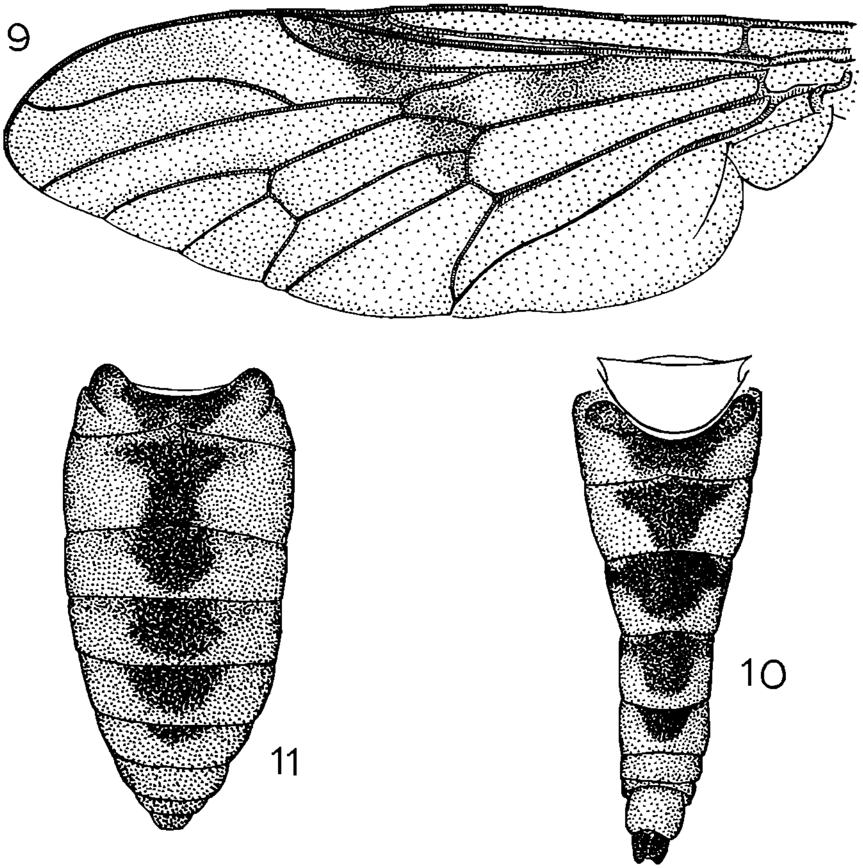
Abdomen reddish-brown, in places with yellowish tinge, marked on dorsum with blackish-brown on tergites 1—5 as shown in fig. 10, in addition with lateral edges of tergites 1—7 bordered with black or blackish-brown. Hypopygium reddish-brown, cerci blackish. Abdominal hairs mostly pale, some dark ones present towards median parts of tergites.

Wing as in fig. 9. Membrane greyish-hyaline, veins brownish. Stigma poorly differentiated, smoky brown and about same colour and translucency as substigmal mark. Costal cell thinly yellowish-brown, subcostal cell similar except at apex where it is more strongly brown. First basal cell brownish in about dorsal two-thirds. First submarginal cell weakly brown-tinged apicad of stigma, except for clear area above fork of R_4 and R_5. Some faint brownish tinge also in second submarginal cell and along veins in all posterior cells. Haltere stem dull yellowish-brown, knob dark brownish.

Body length, 7·6—8·4 mm.

Wing size, 6·6 x 2·4—7·5 x 2·6 mm.

♀. Head (figs. 1, 6) in lateral view relatively less elongate than in *milloti.* Occiput broadly visible from side. Eyes quite widely separated, frons converging slightly towards ocelli, at midpoint its width $\frac{1}{4 \cdot 7}$ — $\frac{1}{5 \cdot 3}$ of greatest transverse diameter of head. Frons velvety black for most of length, at lower end a transverse band of greyish pruinescence which grades on its edges into indefinite, pale bronzy-brown; just above this band is a median, irregularly triangular, tapering area of the same glistening, pale bronze-brown. Ocellar tubercle black, bordered on each side by tapering, greyish-brown extensions of vertex colour along eye margins, these not attaining level of anterior ocellus. Dark part of frons, tubercle and vertex, with many dark hairs; lower (pale) part with much smaller, pale hairs. Antennae almost as in ♂, third segment relatively larger, larger than second, subreniform. Occiput mainly whitish ash-grey, with large, black patches above adjacent to eye margins, these marks widest at their outer ends and with narrow connection to an indefinite dark mark above neck; dark colour of ocellar tubercle continued narrowly onto vertex; on black occipital mark is a well-developed postocular fringe of dark hairs.



Figs. 9-11: *Suragina pauliani* n.sp. (9) ♂ wing, (10) abdomen of ♂, (11) abdomen of ♀.

Thorax as in ♂, except mesonotum brownish-black in one specimen, and notopleural patch more thickly pruinose. Post-scutellum dark brown. Claws of fore leg similar. Parts of fore leg in following proportions:

Thorax length	*Femur length*	*Tibia length*	*Tarsomere length*				
			1	2	3	4	5
30	21	29·5	14	8	7	5	4·5
29	21	29·5	14·5	9	6·5	5	4·5

Abdomen coloured as in ♂, patterned as shown in fig. 11. Lateral borders of tergites 1—7 blackened as in ♂. Abdominal hairs mostly pale whitish-yellow, with some dark ones irregularly distributed.

Wing very like that of ♂, differing only in that brownish mark in first basal cell is reduced to two short strips bordering veins at middle of cell, and weak infuscation in first submarginal cell is divided by an elongate, narrow, clear streak in middle of cell, extending from clear patch above fork of R_4 and R_5.
Body length, 7·8—8·2 mm.
Wing size, 7·8 x 2·6—7·9 x 2·9 mm.
Holotype ♂, 2 ♀♀ paratypes, Manjakatompo Forest Station, 1700m., 1 ♂ paratype, Tsiafajavona Peak, 2200 m., January 1956; 1 ♂ paratype, Col de Mahafompeno, 2200-2400 m., 11-15. XII. 1957 (B. R. Stuckenberg). All these localities on Ankaratra Massif, Ambatolampy district, central Madagascar.
Notes: Specimens from the Manjakatompo Forest Station were found on vegetation bordering the Antsomangana stream where it flows through a fine upper montane forest isolated on the Ankaratra mountain. The specimen from Tsiafajavona Peak was collected from bracken overhanging a small mountain stream near to its source, close to the road from Ambatolampy to Faratsiho, at about the highest point the road attains durings its traverse of the Ankaratra range. The specimen from the Col de Mahafompeno was taken from grass overhanging a small stream deeply cut in a steep, grassy slope above the upper limit of forest, this stream being a tributary of the Antsomangana; the rhagionid *Chrysopilus ankaratrae* n.sp. was found in exactly the same habitat.

It gives me much pleasure to name this species in honour of Dr. R. Paulian, Deputy-Director of the Institut Scientifique during my visits to Madagascar.

Genus *Chrysopilus* Macquart

Sylvicola Harris, 1782, Expos. Eng. Ins. p. 100.
Chrysopilus Macquart, 1826, Rec. Trav. Soc. amat. Sci. Lille, **1825**, p. 403.
Chrysopila Macquart, 1834, Suit. a Buffon, **1**, p. 429.
Leptis, Walker, 1848, List Dipt. Brit. Mus. **1**, p. 213.
Leptipalpus Rondani, 1850, N. Ann. Sci. nat. Bologna (3) **2**, p. 183.
Heliomyia Doleschall, 1857. Natuurk. Tijdschr. Nederl. Ind. **14**, p. 412.
Macellopalpus Bigot, 1886, Ann.Soc.ent. Fr. (6) **6**, Bull., p. xlviii.
Sapporomyia Szilády, 1934, Ann.Mus.nat. hungar. **28**, p. 233.

DEFINITION

Although this genus is very large and widely distributed it remains fairly homogenous and is easily defined and recognised. Perhaps the only taxon whose status in relation to *Chrysopilus* remains in doubt is *Poppiusiella* Frey (see below). Definitions of *Chrysopilus* differing very little in essentials from one another are given by Verrall (1909), Brunetti (1920), Lindner (1925), Leonard (1930) and Paramonov (1962), and no detailed account is necessary here, the distinguishing characters being given in the key (p. 90). However, I would like to mention some important features that have received little attention. The maxillary palpi are one-segmented as in *Rhagio* Fabr., the ninth sternite is fused with the basistyles (separated in related genera such as *Ptiolina* Zett. and *Rhagio*), and the lower part of the pleurotergite is not swollen but undifferentiated. The pile on the pleurotergites (metapleura *auct.*) presents an interesting character; various authors have noted this vestiture (e.g., Paramonov, 1962; Hardy, 1949) but none seems to have noticed that it tends to be segregated into three areas in which the hairs may be distinctive in length, stiffness and colour (fig. 12). This character is not entirely constant for the genus as I have seen a few European and Australian species in which there is little differentiation between posterior and middle groups and the anterior group tends to be generally distributed over the lower part of the pleurotergite. Nevertheless it is a distinctive character in all the Madagascar species, and in a few Central American species, as well as some Australian, African and Oriental ones, that I have seen.

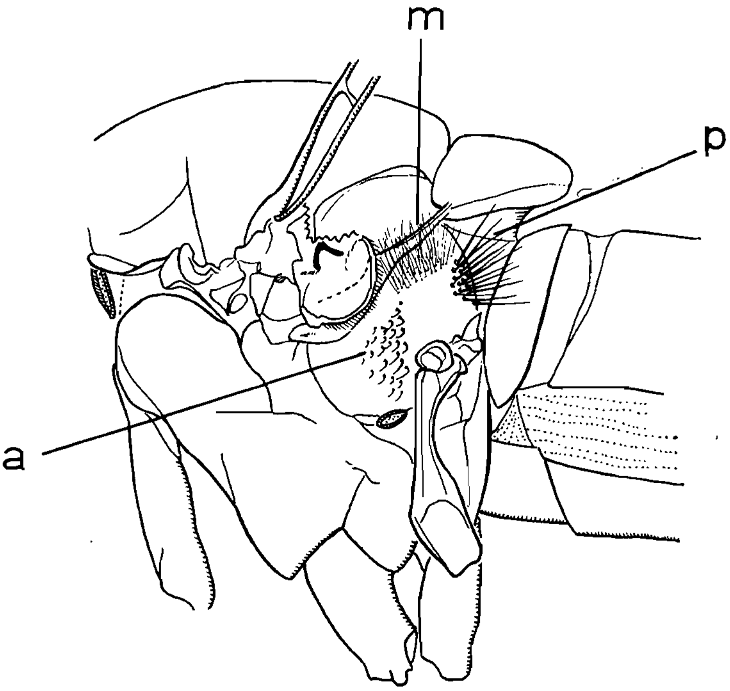


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Fig. 12: Thorax of *Chrysopilus megacephalus* n.sp. in lateral view, showing pleurotergal hair tufts—a = anterior tuft, m = middle tuft, p = posterior tuft.

SYNONYMY

Several small genera have been segregated from *Chrysopilus* on the basis of enlarged palpi in the female. These genera are *Leptipalpus* Rondani (1850) of the Neotropical Region, and *Heliomyia* Doleschall (1857) and *Macellopalpus* Bigot (1886) of the Oriental Region. The relationships of these taxa have been discussed by Brunetti (1909: 425) who considered that *Heliomyia* and *Macellopalpus* might be synonyms of *Leptipalpus*. He maintained *Macellopalpus* as the male sex was unknown at that time, but placed the type species of *Heliomyia* (i.e. *H. ferruginea* Dol. = *Leptis ferruginosus* Wied.) in the genus *Chrysopilus* although he had seen the female and noted the broad palpi which "approximate it to *Macellopalpus*". At the same time he described a second species of *Macellopalpus*, and in 1920 added another. His confused opinions concerning these taxa have been criticised by Malloch (1932: 115-6) who regards the character of the dilated female palpi as not being of generic significance. Malloch considers the type species of *Macellopalpus*, *M.flaveolus* Bigot, and also *M.fulvidus* Brunetti, to be probable synonyms of *ferruginosa*, the type species of *Heliomyia*, and concludes that "there is no reason to remove them" from *Chrysopilus*. *Leptipalpus*, based on a little-known South American species, Malloch does not include for want of material.

Brunetti (1920: 103) later confuses the relationships of *Macellopalpus* even further, in his key to Indian subfamilies and genera of Rhagionidae. This genus is grouped with those having the "third antennal joint kidney-shaped", i.e. *Atherix* Meig. *Suragina* Walk. and *Atrichops* Verr. He then compares *Macellopalpus* only with *Atrichops* (op. cit. p. 122): "This genus differs from *Atrichops* in having a smaller 1st antennal joint, the 3rd (damaged) 'apparently hardly dilated on underside'." His quotation, evidently from Bigot, in fact indicates the opposite of Brunetti's key character, namely that this segment is only slightly dilated on the underside, and Brunetti's own figure of the head of *Macellopalpus fulvidus* Brun. (1909: pl. XII, fig. 8, this number missing on plate, and 1920: pl. ii, fig. 15) contradicts his key as it shows the third antennal segment to be not in the least reniform.

I agree with Malloch that this character has no value for the purpose of splitting groups of species from *Chrysopilus*. As Malloch says, a co-ordinated male character is desirable. Moreover, there are species in which the palps show an intermediate degree of enlargement; the Madagascar species *vadoni* described below is related to *C.ferruginosus* (Wied.) in several important respects, notably in habitus, structure of the head, and features of the wing venation, but the female palpi of *vadoni* are only slightly larger than those of the male and are not "spatulate" as Brunetti describes those of *ferruginosus*, but wider at the apex. The West African species, *Chrysopilus incidens* Curran, has the palpi of the female (not yet described) flattened and moderately dilated over the middle part, the upper edge being more convex than the lower, the difference in the palps between the sexes being not nearly as great as in *ferruginosus*.

Leptipalpus was characterised on the basis of enlarged palpi, antennae as in *Rhagio*, and a petiolate anal cell; the second and third of these characters are present in *Chrysopilus*. Curran (1931) makes no mention of the enlarged palpi but nevertheless considers the genus to be a synonym of *Chrysopilus*.

Sapporomyia Szilády (1934), based on the Japanese species *Leptis basalis* Matsumura, was characterised by the large, hemispherical head and the nature of the eyes of the male (the female unknown), these being large and divided by a transverse groove, the upper division with enlarged facets. Szilády's figure (l. c. fig. 3b) of the type species, taken from Matsumura, is too small to permit the study of details of structure, but seems to show nothing more than a *Chrysopilus* with a broad head. There seems no basis for maintaining *Sapporomyia* and accordingly it is placed in the synonymy of *Chrysopilus*.

THE SUBGENERA OF CHRYSOPILUS

A genus as large as *Chrysopilus* would be more easily handled taxonomically if the species could be segregated into subgenera, and two authors, Szilády (1934) and Frey (1954), have proposed such subdivisions. A review of these subgenera is necessary in order that their applicability to the Madagascar species can be ascertained.

Achrysopilus Szilády, 1934 (no type species designated).
This was described as follows: "Körper gelb oder braun, meist ohne oder nur mit verstreuten Goldhaaren. Flügel gefleckt"; eight Palaearctic species were included. The other Palaearctic species Szilády leaves in *Chrysopilus* s.str. which he defines thus: "Körper schwarz oder aschgrau, bei frischen Exemplaren immer durch goldgelbe oder silberweisse gläzende Haare bedeckt; Flügel mit Ausnahme des Randmals klar oder einfärbig". This may have been a convenient and even a phylogenetically valid division of these species, but it seems to be of dubious value when the species in other parts of the world are considered. These characters of body colour, vestiture colour and wing patterning occur in all combinations, and a study of the Madagascar fauna alone reveals that silvery and golden body hairs and wing markings may have independently evolved in different lines. The main objection to *Achrysopilus* is that it is based on a particular arbitrary combination of convergent characters that if strictly applied to the world's fauna would being together species which are not closely related. Such a taxon has no significance for the zoogeographer. Certainly the inclusion of Madagascar species in *Achrysopilus* would give a false impression of phylogenetic relationships. In terms of Article 13 (*b*) of the Code, the subgenus is invalid.

Frey (1954) includes in his key to East Asian species of *Chrysopilus* three subgenera, and makes no reference to the segregates defined by Szilády:
Chrysopilodes Frey, 1954 (type species, *Chrysopilus boettcheri* Frey, Philippines). The only included species has the third antennal segment oval and twice as long as the first and second segments together, and R_{4+5} and M_1 strongly arched. No comparable species is known in Madagascar.
Poppiusiella Frey, 1918 (type species, *Chrysopilus arctica* Frey, Northern Russia). There seems to be considerable confusion concerning this taxon. Frey described it as a subgenus of *Chrysopilus*, characterised by having the arista short and thick, the palp broadened (spatelförmig) with strong, bristly hairs, and the eyes of the male divided by an impressed, transverse line into a lower part with small facets and an upper part with large facets. Subsequently Szilády (1934: 262-3) discussed the status of *Poppiusiella* and transferred its single species to *Omphalophora* Becker. He stated that he directly compared the type of *arctica* with the types of the two described species of *Omphalophora*, *O.lapponica* Frey and *O.oculata* Becker, and found it to be inaccurately described. His figure shows the antenna of *arctica* not to have a thick arista but a thin one as in both species of *Omphalophora*. Szilády disputes also some points in Becker's description of *Omphalophora*, and finds the arista to be slender and not short and thick, and the apex of the palpi to be "keulenförmig" instead of "knopfförmig". Becker had specifically mentioned, and figured, the thick arista and knobbed palpi. The drawings of the palps and antennae of these three species given by Szilády show them to be rather similar and variations of one basic type. Frey (1954), writing twenty years later, ignores Szilády's paper or is unaware of it, retains *Poppiusiella arctica* in *Chrysopilus*, and puts *Omphalophora* in another (new) rhagionid subfamily, Spaniinae!

A decision on the rights and wrongs of this matter is impossible in the absence of material. It is difficult to believe that both Becker and Frey would be in similar error respecting the species they described; Frey in 1907 had previously described a species of

Omphalophora so must have been acquainted with the characters of that genus, and certainly is familiar with *Chrysopilus*. Yet Szilády writes that he has examined the types of the three species concerned, and his comparisons and figures seem plausible. The only contribution I can make to a better understanding of the matter is to point out that according to Szilády's description and figure the palpi of *arctica* are two-segmented as in the two species of *Omphalophora;* if that is correct, *Poppiusiella* must be excluded from *Chrysopilus* because the members of this genus have undivided palps. At all events, Madagascar has no species related to this north-temperate element.

Variopilus Frey, 1954 (type species, *Chrysopilus aequicellulatus* Frey, N.E. Burma). Frey distinguishes this subgenus by two characters: the palps are elongate-cylindrical, with long, erect hairs overall, and the posterior basal cell is exactly as long as the anterior one. The type specimen of *C.aequicellulatus*, a female, was collected by Dr. R. Malaise at Kambaiti, N.E. Burma, at an altitude of 2000 m. in March 1934. I have found among unnamed material on loan from the British Museum (N.H.) a series of six male specimens of what seems to be an undescribed species closely related to *aequicellulatus*. This series was collected in the Mishini Hills at an altitude of 5350 ft. (1630 m.) by M. Steele in February 1935; the Mishini Hills, according to Malaise's (1945: 3) map, are about 300 kilometers to the north of Kambaiti. The undescribed species is a compact, rather therevid-like one. The body has many long hairs which are dark on the thorax, mostly pale at the abdomen. The legs are short and robust, the wing relatively small for a *Chrysopilus*, with a greyish-tinged membrane, strong veins and a poorly differentiated stigma. The abdomen is proportionately stout and short, the tergites conspicuously bicoloured (dark brown on approximately the basal half, ashy-grey elsewhere). The holoptic head is remarkable for the way the eyes are flattened antero-dorsally, this giving a broadened appearance to the whole head. The parafacials are unusually wide and hardly sunken, and the face is of normal proportions but fairly deeply set in the head so that it is only narrowly visible in lateral view. The palps are strikingly enlarged, being elongate-cylindrical, almost as long as the longitudinal diameter of the head, and with abundant, long, dark, erect hairs. In some specimens the two basal cells are of equal length, but in others the posterior one is a little shorter.

Frey included in *Variopilus* also the following species: *Chrysopilus dives* Loew (Japan), *C.dauricus* Frey (Asia), *C.asiaticus* Lindner (Asia), *C.kyotoensis* Frey (Japan), *C.thoracicus* Fabr. (N. America), and *C.propinquus* Walker (N. America; according to Leonard, 1930: 155, this is a synonym of *proximus* Walk.). Of these I have seen only *kyotoensis*, some specimens kindly supplied by Dr. A. Nagatomi. This species has a greyish-brown colouration and shining yellowish-white abdominal and mesonotal hairs. The wings are exceedingly similar to those of the Burmese species described above. The abdomen is relatively longer and almost normal for the genus, but the legs are somewhat shorter and more compact than is usual. The head is relatively small and the eyes are narrowly separated and slightly flattened above. The parafacials are broad and not inclined inwards. The palps are stoutly cylindrical, longer than the three antennal segments together, and have dark, bristly hairs. In the female the frons is very much broader than long, the eyes are relatively small, the occiput and genae are broadly exposed in lateral view, and the palp is stout and about as long as the three antennal segments together.

This detailed account is prompted by the fact that a few Madagascar species (*griveaudi*, *andringitrensis* and perhaps *ankaratrae*) might qualify for inclusion in *Variopilus*. They agree in having the palps enlarged, cylindrical and hairy, and their habitus is much the same, but they do not have the second basal cell as long as the first. The comparative length of the basal cells probably is not a reliable character as it varies slightly in the Burmese series described above, and in Madagascar species of which good series are available the relative length of these cells varies perceptibly though in no specimen are they equal. The palps are of different proportions in the Burmese and Japanese species compared above, in both being elongate relative to the norm for *Chrysopilus*, and in the Burmese species attaining a remarkable size, perhaps the extreme for the genus. However, even in the Madagascar fauna alone, there are species that form a rough series grading from the palp condition in *kyotoensis* to the other extreme (i.e. very small, narrow, sparsely-haired palps).

Variopilus thus seems to be based on relative characters that are at best only slightly discontinuous within their overall range of development, and the subgenus cannot satisfactorily be maintained. Moreover, although the Madagascar species *griveaudi* and *andringitrensis*, the unnamed Burmese one, and to a lesser extent *ankaratrae*, are remarkably similar in habitus (an atypical head structure, small wings, compact legs and a sombre colouration), the resemblance seems to be due to the expression of convergent evolutionary trends by which the species have become adapted to a montane habitat. This will be discussed more fully in the subsequent paper. Evidently a partial *Variopilus* type has evolved independently in Madagascar, and may have done so also in the other major centres of speciation.

In conclusion, the only described subgenus that seems sufficiently distinct to be retained is *Chrysopilodes* which however does not include any Madagascar species. *Chrysopilodes* contains only its type species, an aberrant one, and helps little in clarifying the classification of the 260-odd species of *Chrysopilus*. As the majority of species probably differentiated in the geographical areas they now inhabit, subgenera reflecting the important phylogenetic developments could best be sought in the species flocks in the different zoogeographic Regions and defined partly on a regional basis, but care would be needed to ensure definitions not invalidated by convergence. Although species possessing unusual and often striking features are to be found in all the major centres of speciation, the differences involved usually are ones of degree rather than kind, and these species often seem to be linked to the average morphological type through intermediate species. A phylogenetic thicket has resulted from the multiplication of evolutionary branches and their entanglement through convergence, and it may be impossible to discern any especially important divisions.

A NOTE ON SOME SPECIFIC CHARACTERS

Mention has already been made (p.100) of the way the hairs on the pleurotergites tend to be divided into three groups which may differ in colouration, stiffness and size. The differences, at least in the Madagascar species, are interspecific, and have facilitated recognition of the species. In fig. 12 the three groups or tufts of hairs are shown; in the descriptions they are referred to as the anterior, middle and posterior tufts. The middle tuft nearly always is smaller and paler than the others, its hairs usually being soft, fine and shining, whereas the hairs in the other tufts are longer, thicker, more bristly and darker. In some Madagascar species the anterior and posterior tufts differ from each other as well. As far as can be observed on available material, the characteristics of these groups of hairs are sufficiently constant to be reliable for taxonomic purposes, showing little intraspecific and sexual variation.

Very little use has been made of the male genitalia in this study; the reason is that few clear-cut interspecific differences have been found, the most notable exception being the case of the species *griveaudi* and *andringitrensis*. Also, there is some uncertainty as to the extent of variation in the genitalia as the material available for most of the species is not adequate for this to be determined.

The wing venation varies considerably in small details, so no complete account is given of all the features. The shape of the stigma and the veins bounding it are useful characters and are illustrated for each species, but it must be borne in mind that some variation can occur here as well. The relative size of the discal cell has been indicated by a comparison of the length of the apical section of M_3 with that of the preapical part, the former being divided into the latter.

Measurements were taken as follows: wing length, from tip to apex of notch between anal lobe and alula; wing breadth, transverse diameter across wing from junction of M_4 with hind margin; body length, always excludes antennae, and is given for males only, the females showing much unnatural variation in the telescoping of the terminal abdominal segments after death. The frons index is obtained by dividing the width of the frons at its midlength into the greatest transverse diameter of the head, except that when the frons is biconcave its width is measured at the narrowest point.The head index is the product of the division of the head width by the thorax width (which is taken as the distance between the outer edge of the upper corner of each mesopleuron). Body length is difficult to measure on curved or damaged specimens, or on ones in which the head is unnaturally positioned, and in the case of some of the species described below this measurement is not given because the condition of the material precludes it. Wing length is a better index to size, and is given for each species.

Key to the Madagascar species of *Chrysopilus*

This key will work only with specimens in fair condition. As the vestiture, particularly that of the pleurotergites, is often referred to, it is unlikely that denuded specimens can be identified with certainty.

Further collecting undoubtedly will bring to light more new species in Madagascar, and will reveal the need for the synonymy of some of the ones described here. Elucidation of the limits of the species has been a difficult matter, due mainly to the closely-knit nature of the fauna which has evolved *in situ* from a small ancestral immigrant stock. Remission is asked for any mommets* which I might unknowingly have created.

1. ♂ ♀. Large species (wing 7 mm.) with wing strikingly patterned with brown as in figs. 61, 62, details of pattern differing slightly between the sexes; costal, subcostal and marginal cells yellowed. R_1 ending far from apex of *Sc*, about midway between *Sc*

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* "These are small, artificially constructed images into which pins are stuck, mainly with a view to making life less tolerable for other museum entomologists. The museum entomologist calls them species, but they bear little resemblance to the species actually encountered in nature." (Mattingly, 1962: 17.)

and apex of wing. ♂ Face in lateral view (fig. 58) protruding subconically forwards; palps narrow, cylindrical, dull orange, mesonotum (fig. 60) fulvous with large, brown, median vitta extending onto scutellum, also small posthumeral and large postsutural brown patches; humeral calli and notopleura yellowish-white pruinose; a greyish-white pruinose area extending down anterior part of pleurotergite onto sternopleuron, pleura otherwise mainly dark brown; anterior and hind coxae dull yellowish, middle coxae very dark brown. ♀ Frons (fig. 59) narrow, vertex sunken, face strongly protruding; mesonotum mostly darkish-brown, humeral calli conspicuously whitish, notopleuron whitish with short silvery hairs; pleura marked as in ♂, but all coxae dark brown; palp somewhat flattened laterally, widest apically, brownish with darkened tip. (Without related Madagascar species) .. .. **vadoni** n.sp.

——Completely different species, wing and thorax without such patterns, R_1 ending closer to *Sc* than to wing tip; if size is comparable and R_4 strongly sinuous, then the wing unmarked and all coxae yellowish 2

2.* Palps brownish; coxae definitely brownish in all species; anterior and middle femora yellowish-brown to dark brown, yellowish only in *superbus*. (Medium or small species, nearly all of them dark, lacking yellow in colouration; all species with enlarged, cylindrical, bristly palps, with genae distinctly visible in lateral view, with dichoptic males not having reddish-brown thoracic colouring, fall in this group) 3

——Palps yellowish, luteous in some species, tip sometimes darkened; anterior and middle femora and coxae yellowish. (Small to large species; frequently with yellow in the body colouring; all large species and all species with R_4 strongly sinuous, except *vadoni* of couplet 1, all species with reddish-brown thoracic colouring, and all with yellowish antennae, fall in this group) 12

3. Genae and lower occiput broad, distinctly visible in lateral view (figs. 13, 15). Palps enlarged, at least as long as face is high, stout, cylindrical, with strong bristly hairs. Genal and lower occipital hairs pale. Post-occipital fringe long, in ♂ longest above and attaining vertex. Face not abruptly protuberant above, but arching forwards evenly. Eyes reduced, not markedly swollen, head proportionately small for a *Chrysopilus*. Wing (fig. 17) relatively small, narrow, veins thick. Legs robust. (♂ Dichoptic, ♀ frons broad. Remarkable, rather therevid-like species, occurring in heath and grass above upper limit of forest on Andringitra Range) 4

——Without this combination of characters. Eyes larger and more prominently convex, head therefore proportionately larger, normal for genus. If palpi are large, cylindrical and bristly, then genal and lower occipital hairs are very dark. If genae are visible in lateral view, palpi are small, shorter than height of face, and not strongly bristly.

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* At this point certain specimens may be difficult to allocate to one of the alternatives. The species *mundus*, couplet 28, which may be only a form of *kimoroensis*, couplet 9, is generally dark with dark coxae, and on the basis of the majority of its characters should go to couplet 3; however the palps of available specimens are more yellow than brown, almost luteous, and if taken to couplet 12 such specimens will key out without difficulty. Most specimens of the variable species *madecassus* (couplets 9, 20 and 28) will go to couplet 12 without doubt, but some specimens occur with brown palps; if these belong to the colour form with bicolorous pleura, the coxae and femora clearly are yellowish; if such specimens (I have seen only three) are of the form with uniformly dark pleura, they may be confusing, though the yellowed abdominal sternites indicate that couplet 12 should be followed; *madecassus* is included in both sections of the key to ensure correct identification of doubtful specimens.

If male definitely dichoptic, then palps small. (Species approaching or of normal *Chrysopilus* appearance; legs more slender, wings proportionately larger, broader. Frons narrow in known ♀♀) 5

4. ♂ ♀. Palpal hairs entirely black. Stigma diffuse, weakly developed (fig. 17). Costal and subcostal cells with brownish stain. Coxae with strong, dark hairs below, some paler ones above. ♀ Frons wide, orbits curving outwards, not definitely angled at vertex .. .. **griveaudi** n.sp.

——♂ ♀. Palpal hairs mixed, dark on apical part, whitish elsewhere. Stigma present, dark brown, sharply defined (fig. 19). Costal cell with slight, brownish stain only around humeral crossvein. Coxae with soft, shining, whitish hairs, only a few slightly brownish. ♀ Frons broader than long, parallel-sided, orbits slightly angled and more distinctly changing direction at vertex (fig. 18) .. .. .. **andringitrensis** n.sp.

5. ♂. Anterior part (prescutum) of mesonotum with abundant, long, soft, recumbent silvery-white hair (in unique specimen this hair extending backward only to transverse suture, remainder of mesonotum possibly rubbed); abdominal tergites 1—6, except anteriorly at the sides, thickly set with similar, recumbent, shining hairs. Parafacials retreating inwards very strongly, orbits not markedly diverging opposite face (fig. 26); face deeply set in head, reduced, not humped above, at most only a small portion very narrowly visible in lateral view. Hairs in posterior pleurotergal tuft strong and dark. Palpi straight, cylindrical, dark, about equal to height of face, with numerous, dark, bristly hairs. Femora and coxae dark brownish. Eye facets of uniform size. (Remarkable on account of thick, recumbent hair whose silvery colour contrasts with dark body. Structure of head characteristic) .. .. **lemur** n.sp.

——Without this combination of characters. Vestiture of mesonotum and abdomen predominantly dark (except in *superbus*); a considerable part of face visible in lateral view 6

6. ♂ ♀. Pleura dark chocolate brown, coxae distinctly brownish, femora contrasting yellowish to yellowish brown. Abdomen densely covered with long, shaggy, shining, recumbent hairs, these hairs reddish dark brown on basal part of tergites, frosty silvery-blue on extensive apical part; ground colour of abdomen dark brown. Mesonotum brown with bright blue, scale-like, appressed hairs. Stigma broad, R_{2+3} strongly bent around stigma to end close to R_1, (fig. 40). ♂ Parafacials narrow and strongly retreating; orbits arched at level of antennae, but not markedly divergent opposite face (fig. 38). (Small species with conspicuously dark pleura and brightly coloured mesonotal and abdominal vestiture) .. .. **superbus** n.sp.

——Without this combination of characters. Medium-sized species without brightly coloured mesonotal and abdominal vestiture. Parafacials not retreating inwards strongly, parafacial orbits markedly diverging in ♂ 7

7. All pleurotergal hairs pale; coxal hairs shining whitish or yellowish; face abruptly protruding above (fig. 29); palps small with fairly weak vestiture 8

——Anterior tuft (and often posterior tuft, especially in ♂♂) of pleurotergal hairs very dark brown or blackish, contrasting with middle tuft which may be shining whitish or shining slightly brownish yellow; coxal hairs dark. (In two species the palps cylindrical with long, bristly hairs; in one species the face not humped; ♀♀ *sogai* may have pleurotergal hairs light brownish in anterior and posterior tufts, but coxal hairs dark and palp cylindrical and bristly) 10

8. ♂. Dichoptic, frons continuous, eyes distinctly separated and somewhat flattened above (fig. 28). Genae visible in lateral view. Haustellum small, labella not much longer than height of face. (From grassy banks of small stream above forest zone on Ankaratra Range) .. .. **ankaratrae** n.sp.

——♂ Holoptic. Eyes convex in normal way. Genae not visible in lateral view. Haustellum larger, normal, labella decidedly larger than face. (Forest species) 9

9. ♂♀. Generally dark brownish, almost unicolorous species; pleura not markedly darker than mesonotum, femora light brownish, abdomen slightly paler at base but not yellowed; stigma rather diffuse, R_{2+3} ending further from R_1 (fig. 31). (If recumbent hairs on lateral parts of mesonotum are slightly bluish silvery, pleura quite strongly shining, and apex of R_{2+3} about length of *m-cu* from R_1, check *mundus*, couplet 28) .. .. **kimoroensis** n.sp.

——♂♀. Pleura intensely dark, blackish brown, especially on mesopleuron and above base of hind coxa. Coxae and femora yellowish with slight brown tinge. Abdomen luteous on basal segments, especially the sternites yellowed. Pleural membrane of abdomen darkened, appearing as a dark, longitudinal stripe that runs into dark thoracic pleura .. .. **madecassus** var. with brownish palps. (cf. couplets 20 and 28.)

10. ♂. Wings with strong brown staining along all veins; costal, subcostal and both basal cells brown except for narrow uncoloured strips bordering veins; stigma large, strong, elongate, filling apex of marginal cell. Palpi large, elongate, cylindrical, with many long, dark strong bristly hairs. Face not humped above. All hairs on head and thorax black except middle pleurotergal tuft. Hairs on coxae and abdominal sternites unusually long and strong. Apical part of vein M_3 much shorter than preapical section .. .. **betsileorum** n.sp.

——Without this combination of characters. If wing has some staining along veins, second basal cell is clear. Stigma not very elongate, not filling apex of marginal cell. Face abruptly protruding above. Apical part of M_3 not much shorter than preapical section 11

11. ♂♀. Wing with some brownish staining in costal and marginal cells, in ♀ also along many of the veins, second basal cell unstained except diffusely at base and apex. Palps cylindrical, about as long as face, with stiff, dark, radiating, bristly hairs. Mesonotum with some very small, recumbent hairs that are shining reddish-brown, yellowish or whitish. ♀ Ocellar triangle elongate, sides about twice length of base. ♀ Vertex with black, erect, bristly hairs, some of which are as long as the three antennal segments without arista .. .. **sogai** n.sp.

——♂♀. Wing hyaline, only the apex very faintly infuscated. Palps reduced, shorter than height of face, palpal hairs bristly but short and sparse. Mesonotum with very fine reddish-brown recumbent hairs centrally, posterior ones distinctly slight bluish silvery. ♀ Ocellar triangle with sides very little longer than base. ♀ Vertex with bristly hairs finer, dark brownish, not longer than basal and second antennal segments together .. .. **clemendoti n.sp.**

12. ♂. Wing (fig. 55) conspicuously patterned, being greyish-hyaline with strong smoky-brown pattern as shown. All mesonotal and abdominal hairs black. Body colouration overall reddish-brown; abdominal tergites with basal or sub-basal bands of black recumbent hairs. Hind femora with many dark, recumbent, scale-like hairs. Antennae yellowish. A small, dark brown mark on lower, anterior corner of mesopleuron, bordering fore coxal cavity. Face quite small but strongly inflated, deeper than high, hardly visible in lateral view being deeply sunken in head. (A medium-sized, reddish-brown species, easily recognised by the patterned wings) .. .. **ivontakae** n.sp.

——Without this combination of characters. Wing unpatterned, or at most with slight darkening at tip 13

13. ♂♀. Entire thorax reddish-brown, mesothoracic spiracle with pale yellow marginal lips, stigma diffuse pale yellowish-brown; abdominal tergites 2-5 in ♂ and 2-4 in ♀ with conspicuous blackish-brown basal bands and bright brownish-yellow apical bands. Antennae brown. Posterior pleurotergal tuft dark, other tufts paler. Mesonotal hairs all black. ♀ Frons diverging towards vertex, uniformly shining silvery-grey pruinose, this pruinescence appearing deep sepia brown when viewed obliquely; ocelli quite close together in equilateral triangle, vein R_4 arched, not sinuous. (Small, reddish-brown species with banded abdomen; ♀ unique in characters of frons) . . . . **cognatus** n.sp.

——Without this combination of characters. All species hereafter with dark brown or blackish borders to anterior thoracic spiracle, and mostly with well-defined dark stigma; if with reddish-brown thorax, then R_4 distinctly, or at least moderately, sinuous 14

14. Medium-sized species with the following combination of characters: a dark mark beneath antennae, usually extending into upper part of face, contrasting sharply with palps, mouthparts and remainder of face, which are yellowish; stigma of distinctive shape, R_{2+3} not strongly bent beneath stigma, R_4 at least moderately sinuous (figs. 52-54); ♂ dichoptic (unknown in *moramangensis*); pleural membrane of abdomen not darkened; mesothoracic spiracle with dark lips; pleura and coxae yellowish-brown, mesonotum brown with yellowish or reddish tinge; recumbent mesonotal hairs brilliantly shining except in *latipennis; (keiseri* group) 15

——Without all these characters in combination, but with some of the following characters in combination: the stigma of conspicuously different shape, face not yellow but brown, no dark mark beneath antennae, size much larger, R_4 very strongly sinuous (fig. 44), pleural membrane of abdomen darkened, upper pleura contrastingly very dark; ♂ always holoptic 16

15. (Three sections here.)

——♂ Dichoptic. ♂♀ Vestiture on mesonotum and scutellum largely dark, no shining blue hairs present. Antennae bicolorous, second segment yellowish or yellow-brown, third segment darkened. All pleurotergal hairs dark brown and bristly, coxal hairs dark brown. Subcostal cell only slightly yellowed. ♀ Frons parallel-sided, tubercle not of contrastingly darker colour .. .. **latipennis** n.sp.

——♂ Dichoptic. ♂♀ Mesonotum and scutellum with vivid electric-blue recumbent hairs. Antennae brownish. All coxal and pleurotergal hairs pale amber. Subcostal and marginal cells yellowed. ♀ Frons slightly convergent upwards, tubercle of contrasting darker colour .. .. **keiseri** n.sp.

——♂ Unknown. ♀ Antennae yellowish. Posterior pleurotergal tuft dark and bristly, middle tuft soft, fine, yellowish, anterior tuft brown or yellowish-brown and not nearly as strong as posterior tuft. Hairs on fore-coxae mostly pale brown, stronger and darker on lower part, on middle and hind coxae dark brown except for some pale hairs on inner surface of middle coxae. Recumbent mesonotal hairs bright pale yellowish-blue to pale bluish, not as brilliant as in preceding species. Frons slightly biconcave, or slightly divergent upwards, tubercle conspicuously darker than surrounding parts .. .. **moramangensis** n.sp.

16. Pleura bicolorous, upper parts dark brownish, distinctly darker than mesonotum and contrasting markedly with lower pleura which are paler, usually yellowish or yellowish-brown; abdomen with dark, longitudinal streak in pleural membrane, this especially evident towards base, this dark streak sometimes including also lateral edges of tergites, and running into dark pleural area of thorax 17

——Pleura not markedly bicolorous, instead unicolorous dark brownish, brownish yellow, reddish yellow-brown or yellow; pleural membrane of abdomen darkened or not 22

17. R_4 strongly sinuous; vein issuing from apex of anal cell (i.e. fused extremities of *Cu* and *A*) long, about half as long as apical section of M_3. Stigma of characteristic shape, R_{2+3} curving about it in a distinctive manner, fig. 41; (*megacephalus* group) .. 18

——R_4 not sinuous but arched, subparallel to R_5; vein issuing from apex of anal cell short, not nearly half length of apical section of M_3. (Medium to smallish species with all pleurotergal hair tufts pale) 20

18. ♂. All pleurotergal hairs pale. (Analavelona Range, Tulear Dist.) .. .. **vespertinus** n.sp.

——Anterior and posterior pleurotergal hair tufts blackish, middle tuft shining whitish or yellowish-white 19

19. ♂. Larger species (body length 9·2 mm.); in ground colour, abdominal dorsum brownish basally, generally becoming blackish apicad, venter luteous, only apical sternites darkened (Madagascar mainland) .. .. **megacephalus** n.sp.

——♂. Smaller species (body length 7·3 mm.); ground colour of abdomen blackish except at base, only second sternite, and to a much lesser extent third sternite, admixed with yellowish (Nossi-Bé Island; a vicariant of *megacephalus*) .. .. **lokobiensis** n.sp.

20. ♂♀. Stigma yellowish-brown, somewhat diffuse. Abdomen almost entirely bright yellowish over at least the basal four segments. All body hairs pale. Halteres yellowish. (A smallish, flavous species with upper pleura intensely dark brown in strong contrast to pale, light yellow coxae and lower pleura) .. .. **sucini** n.sp.

——♂♀. Stigma brownish to blackish-brown, well defined. Abdomen dark brown, only basal two segments sometimes irregularly yellowish-brown. Some of the erect body hairs always dark, especially those on the post-alar callus, first abdominal tergite, and postsutural lateral edge of mesonotum .. .. **madecassus** n.sp. 21

21. R_{2+3} (fig. 34) ending further from apex of R_1, distant about 1½ times length of *m-cu* crossvein. Stigma shorter, not nearly filling apex of cell (Montagne D'Ambre; form

with bicoloured pleura; also couplet 28) .. .. .. **madecassus** nominate subspecies

——R_{2+3} (fig. 35) curving more strongly around stigma to end closer to apex of R_1, distant about length of *m-cu* crossvein. Stigma more elongate-oval, almost filling apex of cell (Madagascar south of Montagne D'Ambre; typical colour form) .. .. subspecies **merinanus** n.subsp.

22. ♂. Large species (body length 9·2 mm.) with pleura darkish brown admixed with yellow and thinly greyish pruinose; middle and hind coxae slightly brownish, anterior coxae more yellow, all coxae thinly greyish pruinose. Antennae darkish brown. Pleural membrane of abdomen darkened; lateral edges of abdominal tergites narrowly darkened. R_4 subparallel to R_5 over basal half, not strongly sinuous; apical part of R_{2+3} smoothly curving to costa, not concave below stigma (fig. 47). Stigma elongate oval, filling apex of cell. Hairs in posterior pleurotergal tuft dark and strong, those in middle tuft soft, shining pale yellowish-brown .. .. **indris** n.sp.

——Without this combination of characters. If size is comparable, then R_4 strongly sinuous (fig. 44). If R_4 not sinuous (fig. 49), then antennae yellowish or size conspicuously smaller and stigma different shape 23

23. Larger species (wing length not less than 5·9 mm.) with R_4 strongly to moderately sinuous (figs. 44, 46); (*mutabilis* group) 24

——Smaller species (wing length up to 5·6 mm.), with R_4 not sinuous but arched and subparallel to R_5 (figs. 34, 49) 27

24. ♂♀. Antennae uniformly very dark brown. (R_{2+3} strongly arched under stigma, fig. 46) 25

——Antennae entirely or partly yellowish or brownish-yellow, sometimes apical segment darker and browner than other segments 26

25. Posterior pleurotergal tuft dark and bristly. Stigma and apical section of R_{2+3} as in fig. 46. (Coastal lowlands, Antongil Bay) .. .. **antongilensis** n.sp.

——Pleurotergal hairs all pale amber. Stigma and apical section of R_{2+3} as in fig. 45. (Marojejy Massif) .. .. **atricornis** n.sp.

26. ♂. Lateral borders of abdominal tergites not darkened. R_{2+3} not distinctly curved beneath stigma, and R_4 less strongly sinuous, as in fig. 48. (Slightly smaller species, light parts of body pale yellowish) .. .. **nemoris** n.sp.

——♂. Lateral borders of abdominal tergites narrowly darkened (especially noticeable on segments 2-3). R_{2+3} clearly arched beneath stigma, and R_1 more strongly sinuous, as in fig. 44. (Larger species, light parts more reddish brown. Pleura may be reddish yellow-brown, or brownish as in *indris*—see description) .. .. **mutabilis** n.sp.

27. ♂. Antennae and palps yellowish; pleura pale yellowish. Pleural membrane of abdomen not darkened. Hairs in posterior pleurotergal tuft thicker and darker than those in other tufts. Stigma small, not nearly attaining apex of cell which is occupied by a large, clear area almost as long as stigma itself (fig. 49) .. .. **zanjensis** n.sp.

——Antennae brown to dark brown; palps yellowish but tip often darkened; pleura dark brown. Pleurotergal hairs more or less uniformly pale yellowish. Stigma differently shaped, clear area in apex of cell not so extensive 28

28. ♂♀. Thoracic pleura and abdomen almost uniformly blackish-brown; pleura quite strongly shining; coxae almost concolorous with pleura, more heavily greyish pruinose.

Abdomen without yellowish colouring. (Dark species; closely related to *kimoroensis*, couplet 9) .. .. **mundus** n.sp.

——♂♀. Thoracic pleura dark brown above but paler below; coxae yellow; abdomen extensively yellowish, nearly all sternites and basal two tergites yellowed, contrasting with apical sternites and with remainder of tergites which become progressively darker apicad. Pleural membrane of abdomen darkened .. .. .. **madecassus** n.sp .. 29

29. R_{2+3} ending further from apex of R_1, this distance about 1½ times length of *m-cu* crossvein. Stigma shorter, not filling apex of cell, as in fig. 34. (Montagne D'Ambre)... .. .. nominate subspecies, f.typ., **madecassus** n.sp.

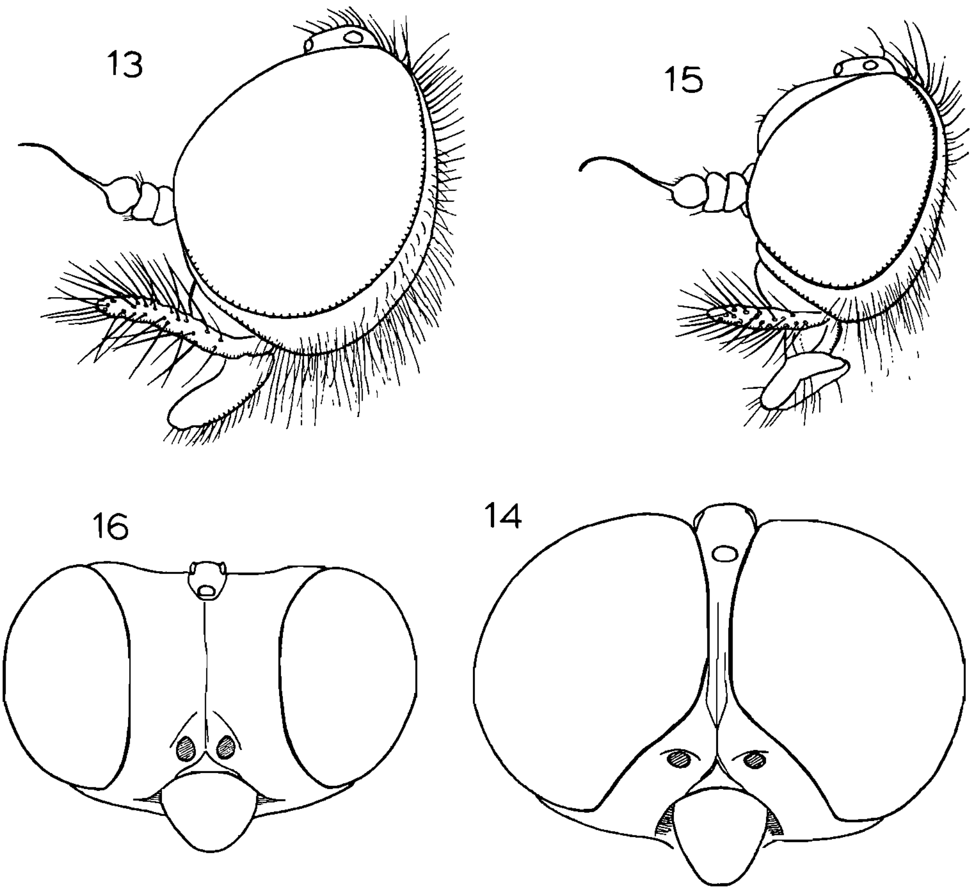
——R_{2+3} curving more strongly around stigma to end close to apex of R_1, separated by about length of *m-cu* crossvein. Stigma more elongate oval, almost filling apex of cell (fig. 35). (Madagascar south of Montagne D'Ambre) .. .. form with uniformly dark pleura, subspecies **merinanus** n.subsp.

Chrysopilus griveaudi n.sp.

Size small. Easily recognised by the characters given in the key, the dichoptic ♂, reduced wings, large, cylindrical, bristly palps, and wide ♀ frons being distinctive. Similar to the sympatric species *andringitrensis*, from which *griveaudi* can be distinguished by the uniformly dark palpal hairs, brownish-stained costal and subcostal cells, diffuse stigma and male genitalia. From above the forest zone on the Andringitra Range.

♂. Head as in figs. 13, 14, dichoptic, frons continuous, eyes separated at narrowest part of frons by about width of anterior ocellus; eyes somewhat flattened above, with overall reduction in size, head correspondingly small, index ·096—1·11 (mean of 27 specimens, 1·04); lower third of eye with smaller facets, these not demarcated by an impressed line. Parafacials narrowly, genae and lower occiput quite broadly, visible in lateral view, depth of genae exceeding height of ocellar tubercle; parafacials flat; genae, occiput and parafacials greyish-pruinose, somewhat smoky, lastnamed with slight yellowish sheen in oblique view. Face relatively small, slightly protuberant above, retreating below, its bounding suture widely ∩-shaped, blackish in ground colour, thinly greyish pruinose. Orbits markedly changing direction opposite lower frons, without indentations opposite antennae. Between face and antennae is a median, triangular, subshining, brownish area. Ocellar tubercle prominent, with dark, proclinate hairs above and longer ones behind; ocelli in isoceles triangle, sides about 1½ times base. Antennae blackish-brown, arista relatively thick. Post-occipital fringe dark, unusually long, on upper part about twice height of ocellar tubercle. Frons brownish-grey pruinose, groove on its lower section dark brown. Mouthparts reduced, labella length about equal to height of face, dark brown. Palps (fig. 13) blackish, large, cylindrical, slightly thicker apicad, longer than height of face, at thickest part equal to width of third antennal segment, with erect, bristly, dark hairs of which some are equal in length to the three antennal segments. Hairs on genae and lower occiput shining pale yellowish.

Mesonotum and scutellum dark sepia brown; pleura and coxae blackish in ground colour, strongly greyish pruinose, upper part of mesopleuron with slight chocolate-brown infusion. All femora uniformly dark brown, tibiae reddish-brown becoming darker apicad,



Figs. 13-16: *Chrysopilus griveaudi* n.sp., head in lateral and anterior views; (13, 14) ♂ head, (15, 16) ♀ head.

tarsi blackish-brown. Erect hairs on mesonotum quite numerous, long (longest about equal to length of scutellum), blackish; recumbent hairs rather sparse, not scale-like, shining yellowish, becoming longer on posterior mesonotum. Scutellum with quite long marginal hairs, usually some of these dark, remainder straw-coloured; recumbent hairs shining yellowish, quite long, fairly densely covering scutellum in well-preserved specimens. All pleurotergal hair tufts yellowish. Mesopleural hairs fine, sparse. Anterior and middle coxae with mixed hairs, stronger and darker ones below, softer and shining yellowish to whitish ones above; hind coxae with yellowish hairs. Femora with some appressed, scale-like, pale greyish hairs. Halteres brownish. Tibial spurs dark brown.

First abdominal tergite dark grey with sepia tinge; remaining visible tergites bicolorous, each sepia brown on basal half, dark ash-grey on apical half; genitalia and retracted segments dark brown. Basal sternites dark greyish with sepia overlay, apical sternites more blackish grey. In well-preserved specimens the abdomen with numerous, erect, yellowish hairs, and abundant recumbent hairs which are largely greyish-silvery, slightly reddish silvery-yellow on basal parts of tergites, the recumbent hairs fairly long and so numerous as to give the abdomen a somewhat woolly appearance. Genitalia as in fig. 21.

Wing (fig. 17) relatively small and narrow, overall smoky grey without clear areas in any of the cells; costal and subcostal cells and anterior half of first basal cell brownish-tinged; marginal cell with weak, elongate, diffuse, brownish stigma filling apex of cell, basal half of cell with some narrow, clear strips bordering R_{2+3} and R_{4+5}. Veins relatively thick, dark brown. R_{2+3} with a long arch below stigma, marginal cell widest at about middle of stigma, vein ending close to R_1. R_4 arched, diverging moderately from R_5. Apical section of M_3 usually a shorter than preapical, rarely equal or slightly longer, discal cell therefore not very elongate, M_3 index 0·94—1·42, mean of 10 specimens 1·12.

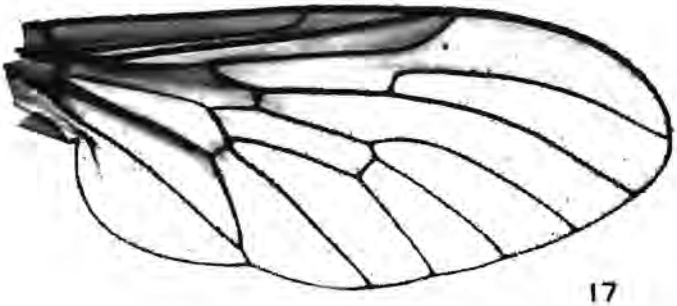


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Fig. 17: Wing of *Chrysopilus griveaudi* n.sp. ♂.

Body length, 4·4—5·3 mm.
Wing size, 3·4 x 2·2—3·9 x 1·7 mm.

♀. Head index, 1·00—1·03. Eyes reduced, somewhat flattened antero-dorsally; frons wider than high, index 2·55—3·0, sides subparallel, orbits curving to back of head without a pronounced change of direction at vertex (figs. 15, 16). Frons slightly reddish sepia-brown, a transverse dark greyish stripe from eye to eye above antennae. Ocellar tubercle dark sepia, ocelli almost in equilateral triangle. Occiput brownish-grey pruinose, a median strip of that colour extending to just behind tubercle from whence on each side a narrow, somewhat indefinite, paler mark runs to orbit, separating a sepia patch on vertex at each side. Frons irregularly convex, visible in lateral view, as are the genae, parafacials and lower occiput. Post-occipital fringe with long hairs above, the longest about three times height of ocellar tubercle. Head and thorax vestiture as in ♂, except hairs on middle and hind coxae entirely blackish in one specimen, femora dark yellowish-brown, tibiae and tarsi slightly paler yellowish-brown, apical tarsal segments darker brown. Abdomen with few erect hairs, these mostly on first and second tergites; basal few tergites with abundant recumbent hairs similar to those of male, except that hairs on apical dark greyish background are all yellowish, and those on anterior part of each tergite are dark reddish-brown.

Retractable abdominal segments dark greyish, fifth to seventh tergites slightly yellowed medially, all with short, dark hairs. Both female specimens are slightly teneral, the wings with stigma and colouration only faintly developed. M_3 index, 1·03, 1·24. Wing size, 3·8 x 1·7—4·1 x 1·7 mm.

Holotype ♂, Pic Boby, Andringitra Range, Ambalavao District, south-central Madagascar, 2400-2500 m., 11-14 January 1958 (B. R. Stuckenberg). Paratypes, 20 ♂♂, 2 ♀♀, with same data; 7 ♂♂, Plateau Soaindrana, north-western side of Andringitra Range, 2060 m., 14-17 January 1958 (B. R. Stuckenberg).

Notes: The biology of this species is of considerable interest and will be discussed in the succeeding paper. In brief, *griveaudi* is not silvicolous but occurs in tropico-alpine heath and grass vegetation on the summit of the Andringitra Range above the upper limit of forest. A full account of the morphological changes in this species apparently associated with the invasion of a new habitat will also be given later.

I have much pleasure in naming the species in honour of Mr. Paul Griveaud, my congenial companion during many journeys in Madagascar.

Chrysopilus andringitrensis n.sp.

Size small. Similar in structure and colouration to *griveaudi*. Easily recognised by the broadly exposed genae, reduced wings, dichoptic male, very wide ♀ frons, and cylindrical, bristly palps. Distinguished from *griveaudi* by pale hairs at base of palp, well-defined stigma, largely greyish-hyaline costal cell, and male genitalia.

♂. Dichoptic, frons continuous though very narrow in middle, eyes separated at narrowest part of frons by about width of anterior ocellus which in this species is small; eyes somewhat flattened above, with overall reduction in size, head therefore relatively small, index 1·00—1·06. Facets very slightly smaller in lower part of eye, an almost imperceptible line demarcating this part. Parafacials not visible in lateral view, or at most only upper part very narrowly visible; genae and lower occiput broadly exposed, depth of genae more than twice height of ocellar tubercle. Parafacials retreating slightly inwards, considerably narrower than the face. Face of normal proportions, curving evenly forwards, sutures bordering face deep on each side, shallow medially, triangular impression between face and antennae isoceles in shape, very low. Orbits markedly changing direction opposite lower frons, with moderate concavity opposite antennae. Palps large, cylindrical, stout, a little longer than height of face, blackish-brown with erect, stiff hairs; hairs on apical part dark and shorter, those basally and especially below longer and pale. Mouthparts reduced as in *griveaudi*. Ocellar tubercle sepia brown, moderately prominent, with a few dark, proclinate hairs above and similar but longer ones behind; ocelli small, in isoceles triangle, sides slightly longer than base. Antennae blackish. Post-occipital fringe dark, quite long above, on upper occiput the longer hairs about three times height of ocellar tubercle in lateral view. Lower frons slightly yellowish grey pruinose, groove darkened above. Parafacials, genae and occiput smoky greyish pruinose; face similarly pruinose but more thinly so, dark ground colour more evident. Hairs on genae and lower occiput shining pale yellowish.

Mesonotum sepia brown, dark ash-grey laterally and posteriorly, with narrow, incomplete, greyish dorsocentral stripes connected to lines of similar colour in transverse sutures.

Scutellum dark ash-grey. Pleura and coxae dark, uniformly greyish pruinose. Femora brown, tibiae and tarsi dark brown. Erect mesonotal hairs long, dark, showing a tendency to linear arrangement on dorsocentral lines and in a median band; recumbent mesonotal hairs small, soft, shining pale yellowish, rather sparse (available specimens slightly rubbed).

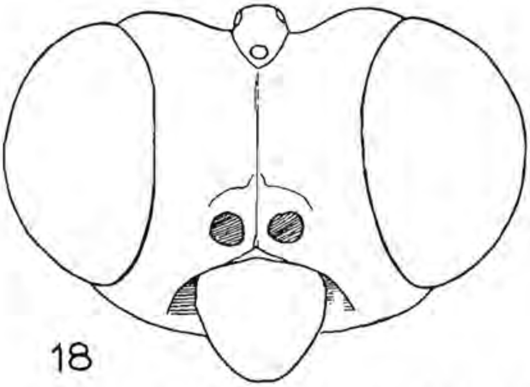


Fig. 18: *Chrysopilus andringitrensis* n.sp., ♀ head in frontal view.

All erect hairs on scutellum dark, recumbent ones resembling those on mesonotum. All pleurotergal hairs pale yellowish. All coxae with shining, whitish hairs. Femora with scanty, small, pale yellowish, appressed scale-like hairs, Tibial spurs dark brown. Haltere knob brown, stem paler.

Abdomen coloured exactly as in *griveaudi*, but with much sparser hairs. Erect hairs whitish; recumbent hairs whitish or pale yellowish on dark grey apical parts of each tergite, coppery-brown on sepia basal part. Genitalia as in fig. 22.

Wing (fig. 19) relatively small, narrow, greyish-hyaline with slight brownish tinge along the veins except in basal part of wing, this staining most perceptible at base of first

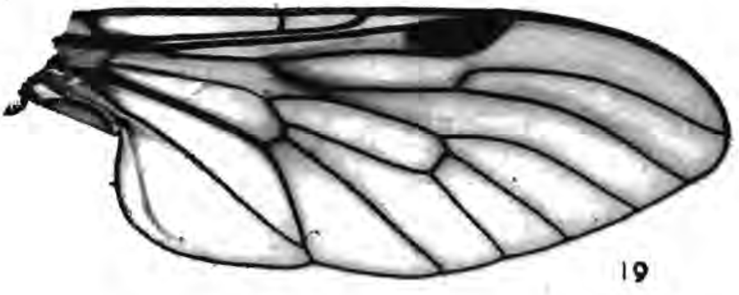


Fig. 19: Wing of *Chrysopilus andringitrensis* n.sp. ♂. The cross-vein in the costal cell of this wing is abnormal.

submarginal cell and around *m-cu* crossvein, slight unstained streaks in most of the cells; costal cell brownish-tinged only around humeral crossvein. Stigma brown, strong, sharply-defined, filling apex of cell. R_{2+3} distinctly bowed around stigma, width of cell across middle of stigma about twice its width at origin of *Rs;* R_{2+3} ending very close to apex of R_1, almost closing cell. R_4 unevenly arched, not sinuous, diverging moderately from R_5. Apical section of M_3 a little shorter than preapical, discal cell therefore not very elongate, index 1·27—1·31. Veins relatively thick, dark brown.
Body length, 5·1—5·2 mm.
Wing size, 3·9 x 1·7—4·0 x 1·8 mm.
♀. Head index, 0·97. Eyes relatively small; frons (fig. 18) very wide, wider than high, index 2·65, sides parallel, orbits quite markedly changing direction opposite anterior ocellus. Frons bulging somewhat, with narrow median groove, coppery-tinted sepia, a small, greyish mark connecting antennal sockets above. Ocellar tubercle dark sepia, ocelli in isoceles triangle, sides 1½ times length of base. Post-occipital fringe absent on mediolateral part of occiput, best developed on vertex which has an irregular row of erect, dark hairs on each side. Parafacials flat, barely visible in lateral view, but genae broadly exposed, deep. Groove surrounding face deep, complete and well-defined anteriorly. Palps brownish, haired as in ♂. Genal and lower occipital hairs shining whitish, abundant. Thoracic colouring as in ♂, but pleura and coxae with yellowish-brown undertone. Femora yellowish-brown, with numerous, scale-like, pale yellowish, appressed hairs. Tibiae yellowish-brown; tarsi similar but slightly darker, apex of each segment narrowly darkened, except fifth segment which is half darkened. Abdomen as in ♂, but vestiture differing in that first tergite and greyish apical portion on each of next three tergites have abundant, long, soft, recumbent, silvery or whitish, shining hairs; recumbent hairs on sepia basal part of each tergite mixed dark coppery and black. Retractable segments dark sepia, with fine, pale hairs. The single ♀ is slightly teneral and the wing colouration is undeveloped. M_3 index, 1·23.
Wing size, 4·7 x 2·1 mm.
Holotype ♂, from bush-covered slopes above Plateau Soaindrana, Andringitra Range, Ambalavao District, south-central Madagascar, 2060-2160 m., 14-17 January 1958; 1 ♀ paratype with same data; 2 ♂♂ paratypes from Pic Boby, with data as recorded under *griveaudi* (B. R. Stuckenberg).
Notes: This species is entirely sympatric with *griveaudi* but appears to have been much less common. A special search may have revealed that it occupies a slightly different habitat which I had not properly collected.

Chrysopilus betsileorum n.sp.

Size moderately small. A very dark species with dark head and thoracic vestiture, the pleura and especially the abdomen quite strongly shining; easily recognised by the characters given in the key, the extensively brownish-stained wings, large stigma, dark and strong thoracic vestiture, and large, cylindrical, bristly palps being distinctive. It is the only Madagascar species with parafacial hairs, except *sogai* in which they are minute. Can be confused only with *sogai*, differing from that species in the male sex in having the brown stain on the wings darker and extending throughout second basal cell, palps larger, apical section of M_3 much shorter than preapical, stigma very elongate and filling apex of cell, and body generally with more numerous erect hairs.

♂. Head of normal shape, index 1·13, holoptic. Lower third of eye with distinctly smaller facets, separated by a slight transverse linear depression from upper sector. Genae flat, reduced, not or only very slightly visible in lateral view. Parafacials retreating moderately inwards, dark ash-grey pruinose with slight brownish tinge. Face moderately protuberant above, pruinose like parafacials but more thinly so, dark ground colour showing through, A blackish triangular area immediately above face. Orbits diverging widely at lower part of frons, shallowly concave opposite antennae. Palps large, stout, cylindrical, longer than length of face, blackish, with numerous stiff, blackish, bristly hairs. Mouthparts of normal size. Ocellar tubercle moderately prominent, dark brown, ocelli quite large, in equilateral triangle; tubercle with some short, dark, proclinate hairs above, similar but longer ones behind. Occiput mostly dark ash-grey, narrowly dark brown above adjacent to orbits; post-occipital fringe short, not extending onto dark brown marks on upper part of occiput. Lower frons brownish-grey pruinose, groove dark. Antennae blackish brown, arista brownish, third segment with minute, shining yellowish hairs apically. Genae and lower occiput with stiff, blackish hairs, these extending onto inner side of parafacials in an irregular row, diminishing in size towards antennae.

Mesonotum and scutellum dark, sordid, slightly reddish brown. Pleura and coxae blackish-brown, quite strongly shining, mesopleuron and coxae thinly brownish pruinose. Femora dark brown, tibiae brown, tarsi brown becoming darker apicad. Mesonotum and scutellum with erect hairs of two sizes, larger, stronger ones mixed with others about half as long and strong, all dark brown or blackish and becoming longer on hind part of mesonotum and on scutellum; some fine hairs on lateral parts of mesonotum are dark reddish. All pleurotergal, mesopleural and coxal hairs strong, numerous, longer than usual, and black. Femora with some very small, appressed, scale-like hairs, and fringes of dark brown hair below. Tibial spicules numerous on hind legs. Spurs light brown with dark tips. Halteres dark brown.

Abdomen almost unicolours, dark, blackish-brown, quite strongly shining. First tergite with abundant, long, erect hairs, these blackish medially, pale yellowish on sides. Tergites 2—4 with long, erect, pale yellowish hairs laterally, fifth with both dark and pale yellowish hairs, sixth with only dark erect hairs; each of tergites 2—6 in addition with shorter, suberect dark hairs medially, and small, recumbent, blackish or dark reddish hairs on about basal two-thirds, apical third with longer pale yellowish or silvery white, shining, recumbent hairs, and some pale ones scattered among dark ones. Sternites mostly slightly browner than corresponding tergites, apical sternites darker and blackish before genitalia. Third and fourth sternites with long, yellowish, erect hairs, fifth with mixed blackish and yellowish hairs which are semi-erect posteriorly, sixth and seventh sternites with black, semi-erect hairs. Genitalia as in fig. 23.

Wing (fig. 20) proportionately a little smaller and narrower than usual; membrane greyish-hyaline with extensive, strong brown staining along all veins; in addition, costal and subcostal cells almost uniformly brown, both basal cells slightly paler brown; marginal cell with large, elongate, strong, mahogany-brown stigma entirely filling apex of cell; on its inner side stigma bordered by a narrow, pale streak, basal remainder of cell brown except for elongate, narrow, clear streaks bordering prefurca and basal section of R_2. Anal lobe greyish-hyaline except along anal vein, alula and squama brownish. Veins dark brown. R_{2+3} with long, quite deep bow around stigma, its apex distant from R_1 about $1\frac{1}{2}$ times length of *m-cu* crossvein. R_4 gently arched, subparallel, diverging slightly from R_5. Apical section of M_3 short, index 2·00, discal cell therefore elongate. Base of second marginal cell as long as base of third one in both specimens.

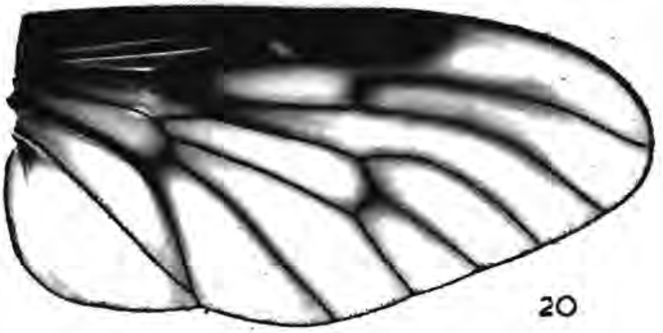


Fig. 20: Wing of *Chrysopilus betsileorum* n.sp. ♂.

Body length, 6·1 mm.
Wing size, 4·6 x 2·2 mm.
♀. Unknown.

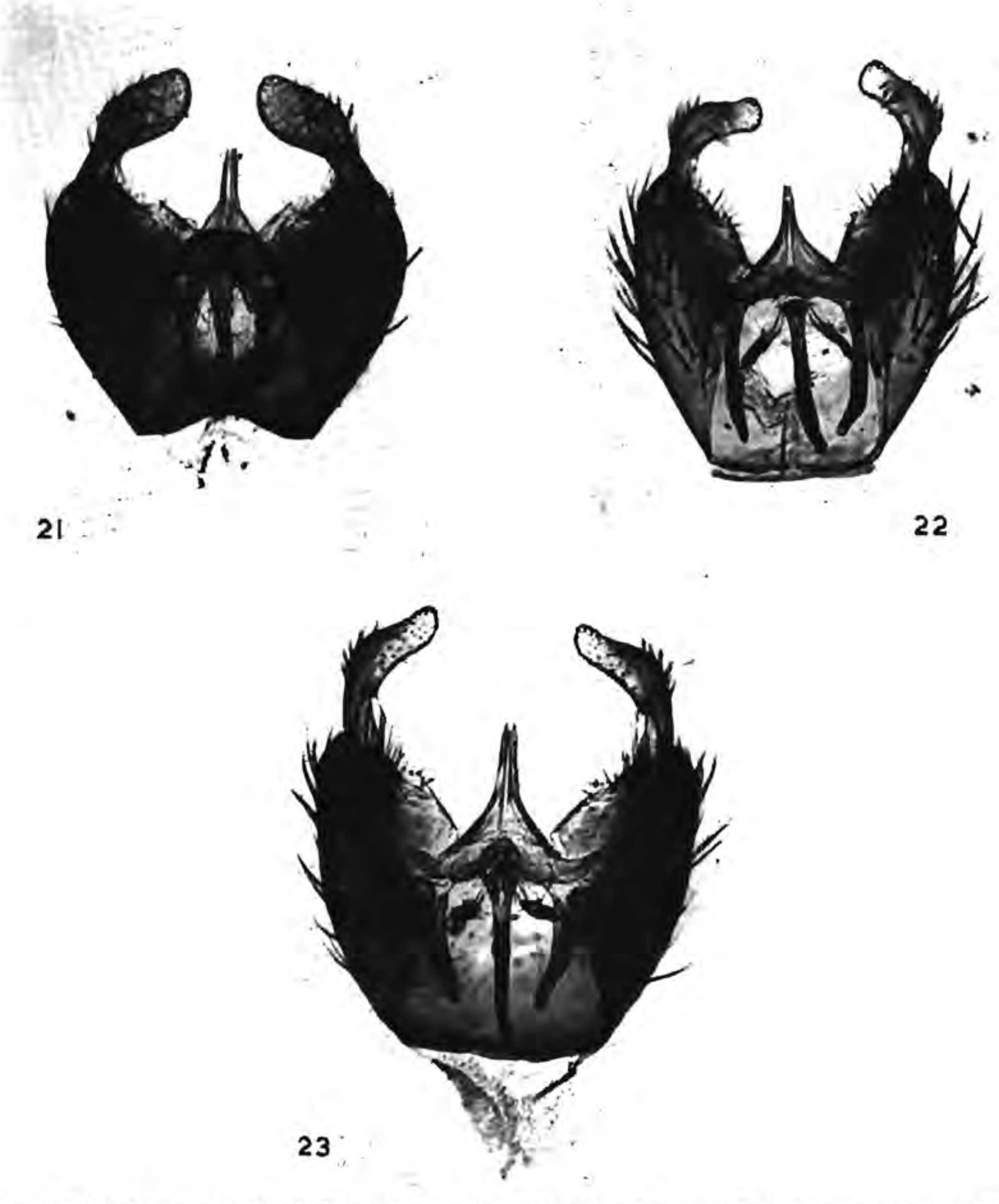
Holotype ♂, slightly teneral paratype ♂, Anjavidilava, northern end of Andringitra Range, Ambalavao District, south-central Madagascar, 2020 m., 17-21 January 1958 (B. R. Stuckenberg).

Notes: Collected at the upper limit of forest. The specific name refers to the Betsileo ethnic group who inhabit the southern part of the high central plateau of Madagascar, including the Andringitra area.

Chrysopilus sogai n.sp.

Size medium. In body colouration very similar to *betsileorum*, also a dark species with the abdomen noticeably shining. Recognised in both sexes by a slight irregular brownish stain in the costal, marginal and first basal cells, the short, subcylindrical, bristly palps, and dark coxal hairs, and in the ♀ alone by the brownish stain along the wing veins, and the elongate ocellar triangle. Distinguished from *betsileorum* by the smaller stigma, paler brown stain on the wings, smaller palps and longer apical part of M_3. The wing of the ♀ is broadly rounded, and has the anal lobe relatively smaller and less angled than in the ♂.

♂. Holoptic, head of normal proportions, index 1·24, facets in lower third of eye much smaller than facets in upper part, a transverse impression demarcating the two parts. Parafacials almost as broad as face, retreating inwards moderately, greyish pruinose with slight brown sheen, a few minute hairs on lower part. Face brownish, narrowly yellowish-grey on sides, suprafacial triangle as high as broad at base, brownish-grey, intermediate



Figs. 21-23: Male genitalia of *Chrysopilus* species; (21) *griveaudi* n.sp., (22) *andringitrensis* n.sp., (23) *betsileorum* n.sp. To the same scale.

in colour between parafacials and face; face quite strongly humped above. Orbits diverging widely opposite lower frons, with prolonged, slight concavity opposite antennae. Palps dark brown, subcylindrical, slightly stouter apically, shorter than height of face, with bristly, erect, dark brown hairs of which the longest almost equals palp length. Genae reduced; lower occiput narrowly visible in lateral view, with short, stiff, dark brown hairs, the hairs becoming shining dark brownish higher on occiput. Occiput ash-grey below, mixed with dark brown above, upper orbits bordered with strips of blackish-brown on which post-occipital fringe is not developed. Ocellar tubercle quite prominent, ocelli large, equal, in equilateral triangle, tubercle with very short hairs above, a few longer, proclinate ones behind. First antennal segment dark brown, second light brown, third almost as dark as first, arista concolorous with third segment.

Mesonotum and scutellum coloured as in *betsileorum*, dark, sordid, slightly reddish-brown, with slight traces of pale, narrow, dorsocentral stripes joined to stripes of similar colour in upper ends of transverse sutures; notopleuron becoming greyish below. Pleura and coxae dark brownish, sub-shining, thinly brownish pruinose, upper edge of mesopleuron darkened. Femora brown, slightly yellowish-brown apically, tibiae and metatarsi pale yellowish-brown, other tarsal segments darker brown; spurs reddish-brown; spicules much fewer than in *betsileorum;* femora with inconspicuous brownish-grey, scale-like hairs above. All erect mesonotal and scutellar hairs black and stiff; recumbent hairs not scale-like, very small, sparse, dark coppery-red. Anterior and posterior pleurotergal tufts bristly and black, middle tuft shining reddish-yellow. Anterior upper mesopleural hairs long. Coxal hairs stiff, dark brown, some with reddish tinge. Halteres with dark brown knob, yellowish-brown stem.

Abdomen almost unicolorous dark-brown to blackish-brown, more blackish apically, quite strongly shining. Erect hairs numerous and quite long, dark brown and reddish-brown. Posterior borders of tergites with narrow, irregular bands, absent laterally, of recumbent, soft, shining, pale silvery-yellow or pale reddish-yellow hairs; recumbent hairs elsewhere on tergites blackish, inconspicuous, some of them dark reddish in some positions. Sternites concolorous with their tergites.

Wing (fig. 24) greyish-hyaline, slightly smoky on apical third, with faint brownish tinge along veins, a definite tinge at base of R_{4+5} and around *m-cu*, and irregularly in basal cells; costal cell light brownish, humeral crossvein bordered with brown; subcostal cell brown-tinged only in corners adjacent to costa; marginal cell with narrow, hyaline streaks bordering bounding veins in basal third, in middle third with a brownish area; stigma brownish, irregular, with diffuse borders,enclosed on both sides by an adjacent yellowish area, the outer one filling apex of cell. R_{2+3} with a long arch beneath stigma, ending about the length of *m-cu* from apex of R_1. R_4 arched, slightly undulant, diverging moderately from R_5. M_3 index 1·22 in both specimens, discal cell short, narrow and almost parallel-sided.

Body length, 7·2 mm.

Wing size, 5·8 x 2·6 mm.

♀. Head index 1·04—1·12. Frons parallel-sided, index 3·15—3·45, short, with a deep median groove that intersects a transverse groove from eye to eye shortly above antennae; frons cinnamon brown with slight reddish tint in some views, a narrow line along orbits and in median furrow pale greyish, frons below transverse groove greyish in one specimen. Parafacials half width of face, retreating. Palps relatively longer than in ♂, as long as face, dark brown, cylindrical, bristly. Hairs on lower occiput dull whitish. Upper hairs in postoccipital fringe multi-seriate, forming a group on each side of vertex, all of them dark and bristly, some as long as three times height of ocellar tubercle. Ocelli in isoceles triangle, sides nearly twice base; tubercle moderately elevated, behind each posterior ocellus a small blackish mark. Antennae entirely blackish.

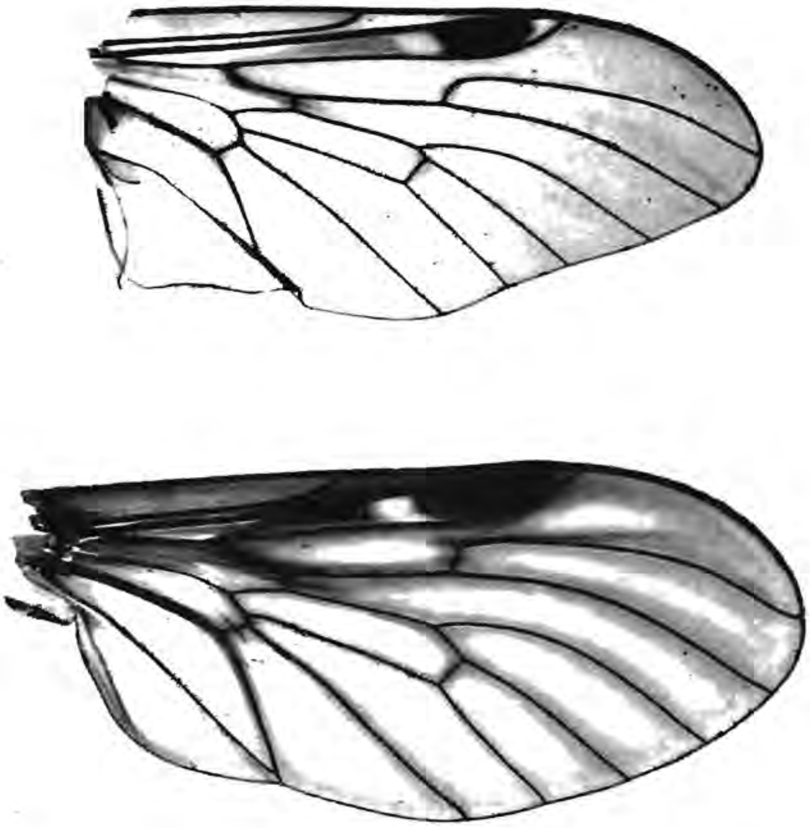


Fig. 24: Wings of *Chrysopilus sogai* n.sp., ♂ above, ♀ below. To same scale.

Mesonotum somewhat olive grey, with sepia overtone on disc. All erect hairs dark and bristly, those on disc arranged in irregular dorsocentral series. Notopleural ones especially strong and bristly. Recumbent hairs more numerous than in ♂, the infradorsocentral ones pale reddish or reddish-yellow, those outside the dorsocentral lines whitish. Pleura and pleural vestiture as in ♂.

Abdomen dark, the non-retractable tergites after the first faintly bicolorous with the apical half to one-third dark olive-grey, remainder with an indefinite dark sepia overlay. First tergite entirely dark olive-grey with sepia overtint, with erect pale hairs laterally, shorter and suberect dark hairs medially, and recumbent, long, whitish and pale reddish-yellow, shining hairs. Second and third tergites with long, pale, erect hairs laterally, and shorter, dark, suberect hairs medially; the anterior part with dark, sepia overtone having numerous, recumbent, dark-reddish hairs, apical section with a band of longer, shining, whitish recumbent hairs which in addition cover the sides of these tergites. Fourth tergite with dark reddish hairs on basal half and shining whitish hairs on apical half, in addition with suberect dark hairs, and along posterior border long, dark reddish-brown hairs.

Wing (fig. 24) differing in several respects from that of ♂. In shape more broadly rounded apically, and anal lobe narrower with less angled margin; in ♂ the anal lobe at its widest is nearly twice greatest width of anal cell, but in ♀ only about 1¼ times. Brown staining marginal to veins, only faintly perceptible in ♂, is strongly developed though variably so in the three available specimens; the width of the hind marginal stain varies, and the long, clear streaks in the cells vary in width accordingly. Costal, subcostal and most of first basal cells are brownish. Stigma darker, better developed and better defined than in ♂, almost filling apex of cell, elongate-elliptical, the clear yellowish area at inner end of stigma present in all specimens. Apical section of M_3 a little shorter than preapical, index 1·18—1·36, discal cell relatively larger and wider apically than in ♂. Base of second posterior cell equal to or larger than base of third in all ♀♀; in both ♂♂ the base of the second much shorter than the third.

Wing size, 5·0 x 2·3—5·6 x 2·7 mm.

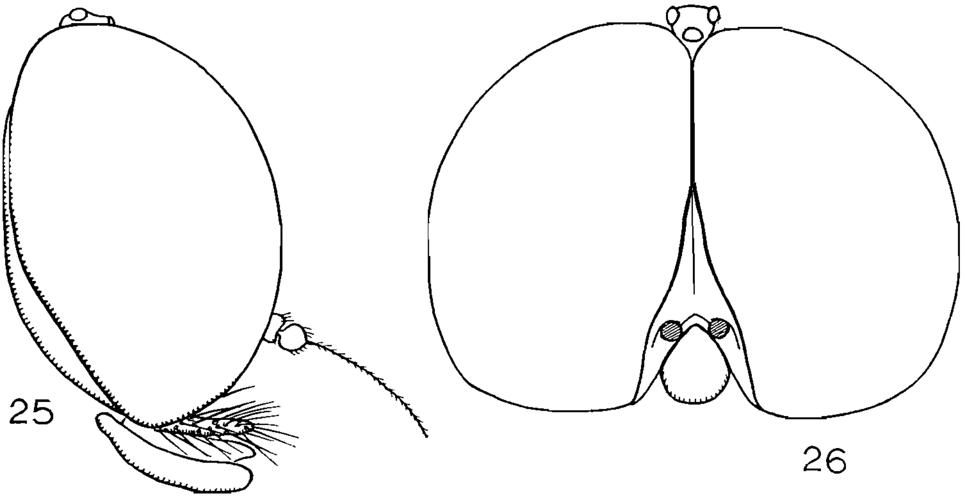
Holotype ♂, Ambodifiakarana, Marojejy mountain, 1600 m., December 1958 (Raharizonina); paratypes 1 ♂, 2 ♀♀, Marojejy-Ouest, 1600 m., November 1959 (P. Soga); paratype ♀, Matsabory, Marojejy Mountain, 2030 m., December 1958 (Raharizonina). Marojejy Mountain is a part of the Tsaratana complex, and is in the Sambava District of north-east Madagascar.

Notes: This interesting species clearly is related to *betsileorum* and apparently is also an upper-montane forest dweller. The sexual differences in the wing are unusual, but I believe the sexes are correctly matched.

Chrysopilus lemur n.sp.

Size moderately small. Dark, blackish-brown species with dark brown femora and coxae, clothed on anterior part of mesonotum and on abdominal tergites with long, soft, recumbent, shining, silvery-white hairs. Stigma elongate, brownish, not sharply defined, not filling apex of cell. Lower section of frons of ♂ shining silvery-grey pruinose. Other characters given in key, couplet 5. A distinctive species of uncertain affinity.

♂. Holoptic. Head index 1·05, shape as in figs. 25, 26. Eye facets of uniform size, a slight transverse depression demarcating lower third of eye but facets in this lower part equal in size to those above. Parafacials retreating very strongly inwards, the face, which is quite small but strongly inflated, therefore very deeply set in head and with only a very narrow portion visible in lateral view; correlated with this, the orbits only a little divergent opposite lower frons, with small but definite concavity opposite antennae. Eyes large, lower occiput only narrowly visible in lateral view. Lower frons shining silvery-grey pruinose including median groove, parafacials similar though not so thickly pruinose. Face light brown, subshining, thinly greyish pruinose. Palps darkish brown, short but stoutly cylindrical, about as long as height of face, with many stiff, black, bristly hairs the largest of which equals length of palp. First antennal segment dark brown, remainder and arista medium brown. Ocellar tubercle not prominent, with short, dark hairs behind, ocelli quite large and in equilateral triangle, tubercle and upper frons thinly very dark greyish pruinose. Occiput dark, dull, lead-grey. Postoccipital fringe complete, attaining ocellar tubercle. Hairs on lower occiput long, soft, pale yellowish or whitish.



Figs. 25, 26: *Chrysopilus lemur* n.sp., ♂ head in lateral and frontal views, partially reconstructed.

Ground colour of mesonotum and scutellum shining blackish; prescutum with large patches of abundant, soft, recumbent, shining silvery-white hairs, notopleuron thickly set with similar but slightly yellowish white hairs. Scutum somewhat damaged, possibly rubbed, with some sparse, small, recumbent hairs, black in some positions, dark reddish in others, which may be naturally the only vestiture on hind half of mesonotum, though possibly in fresh specimens the long, silvery-white hairs may occur there as well. Among silvery hairs on prescutum are some fine, dark, erect hairs. Scutellum with long, dark, bristly hairs marginally, and some small, dark reddish hairs on disc. Pleura dark blackish-brown, thinly dark-greyish pruinose, coxae dark brown. Anterior legs missing in type; remaining femora dark brown, middle femora with testaceous apical quarter, tibiae and tarsi brownish, hind tibiae with quite strong black spicules, tibial spurs yellowish-brown with dark tip. Hairs in anterior and middle pleurotergal tufts soft and pale yellowish, posterior tuft with strong, black, bristly hairs. Anterior and middle coxae with dark reddish and blackish hairs, anterior coxae with a few pale ones above, hind coxae with few hairs, some of which are stiff and dark, others soft and pale. Haltere knob blackish, stem yellowish-brown.

Abdomen dark, subshining, blackish-brown; exposed tergites thickly set with long, rather woolly, recumbent hair, somewhat discoloured in the type, dirty yellowish white, possibly originally shining whitish or silvery-white like the recumbent mesonotal hair. On tergites 2—6 this thick, recumbent hair extends to lateral margins on posterior half only, and to anterior margin in median section only, absent on broad anterior corners of each tergite. In addition, these tergites have some erect, brownish hairs. Sternites with semi-erect hairs, these longer on posterior margins of each tergite, dark brown or blackish.

Wing (fig. 27) greyish-hyaline, slightly smoky apicad of distal end of discal cell and in costal and subcostal cells. Stigma light brownish, elongate, somewhat diffuse marginally, not quite filling apex of cell. R_{2+3} with gentle bend under apical half of stigma, marginal cell without any marked increase in width over stigma; R_{2+3} slightly divergent from R_1 up to its gentle forward flexure, ending distant from apex of R_1 a little more than length of *m-cu*. R_4 arched, slightly undulant. Apical section of M_3 a little shorter than preapical, index 1·28, discal cell moderately narrow, almost parallel-sided.

Body length, 5·9 mm.

Wing size, 4·5 x 2·1 mm.

Holotype ♂, Ambohimanakana, Manambato (Anove).

Notes: The type locality, Manambato, is on the northern side of the Tsaratanana Massif in the north of Madagascar. The dark colouration and the thickened, bristly palps suggest that this species may be related to *betsileorum* and *sogai*. The head structure is unique among the Madagascar *Chrysopilus* species.

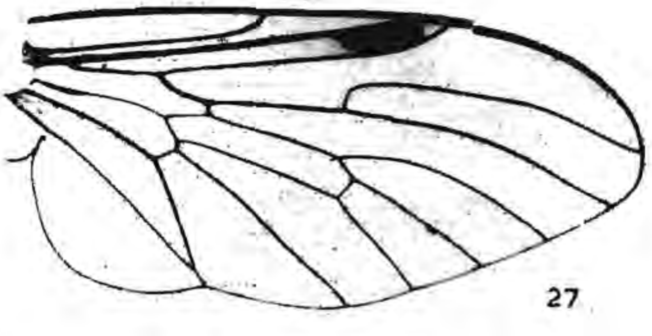
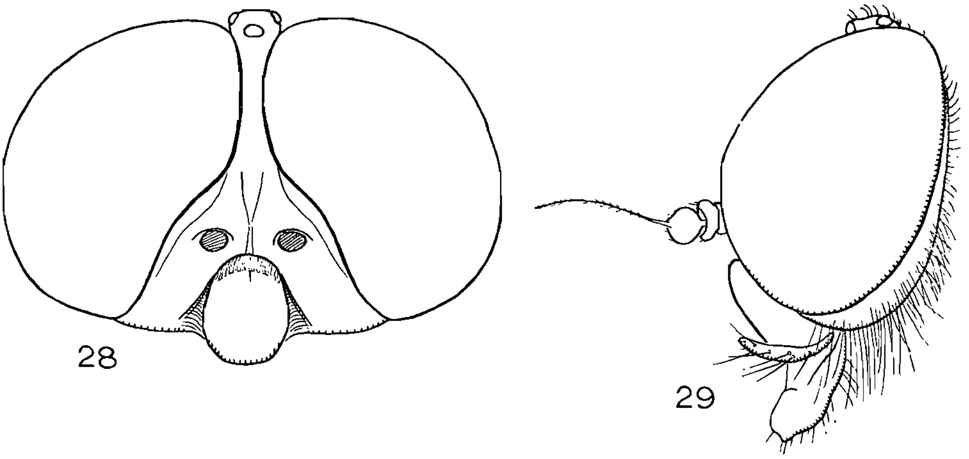


Fig. 27. Wing of *Chrysopilus lemur* n.sp. ♂.

Chrysopilus ankaratrae n.sp.

Size medium. An almost uniformly darkish brown species with pale coxal and pleurotergal hairs, very similar in appearance to *kimoroensis* and *mundus* but at once distinguished in the ♂ by the dichoptic and rather small head, and the relatively reduced eyes; frons continuous, at its narrowest as wide as anterior ocellus (which is unusually large); face humped above, in profile descending in almost a straight line. Depressed mesonotal hairs all pale reddish, pale reddish-yellow, or pale yellowish, none bluish. Stigma and veins R_4 and R_5 as in fig. 30. ♀ unknown, but probably characterised by vestiture colouring, shape of stigma, and possibly a widening of the frons matching the structural modification of the ♂ head. An upper montane species, occurring in grassland above the forest limit on the Ankaratra Massif.

♂. Head as in figs. 28, 29, dichoptic, eyes distinctly separated at middle of frons by about transverse diameter of anterior ocellus, frons continuous. Head relatively small, hardly wider than thorax, index 1·00—1·08 (mean 1·06), eyes less obviously swollen than is normal and relatively reduced in area, also somewhat flattened above; genae and lower occiput distinctly visible in lateral view, depth of gena about equal to height of ocellar tubercle. Facets in lower third of eye only very slightly smaller than those in upper part, a transverse depression demarcating the two areas though only faintly so on sides. Frons yellowish-brown pruinose, broadly grooved at lower end, shallowly biconcave in shape, its narrowest part at about upper third from tubercle to antennae. Antennae dark brown. Parafacials rather flattened, a little sunken, brownish-grey pruinose. Face visible in lateral view but not sharply protruding, humped above, in profile descending in about a straight line, brownish-grey pruinose with irregular, shifting, dark brown markings above. Palps small, brownish, with stiff brown hairs. Mouthparts brownish, relatively small, labella hardly longer than height of face.



Figs. 28, 29: *Chrysopilus ankaratrae* n.sp., ♂ head in frontal and lateral views.

Ocellar tubercle brownish pruinose, prominent, ocelli relatively large, anterior one larger than posterior pair, arranged in almost equilateral triangle, tubercle with some small hairs above. Occiput ash-grey with slight brownish tinge, very dark brown above adjacent to vertex and along eye margins. Hairs on lower occiput pale yellowish and whitish, post-ocular fringe attaining vertex.

Thoracic dorsum variably discoloured in available specimens, this species apparently liable to greasiness, irregular blackish marks appearing on mesonotum. Unaffected parts indicate the mesonotum and scutellum to be woody-brown. Erect hairs rather short, stiff, brownish; recumbent hairs pale reddish, pale reddish-yellow or pale yellowish. Pleura brown with thin overlying dark greyish pruinescence, on upper pleura ground colour darker brown and showing through pruinescence more strongly, upper part of mesopleuron very dark brown. Coxae and femora brownish, latter with somewhat pale basal and apical ends. All pleurotergal hairs pale and rather soft, coxal and mesopleural hairs whitish or pale yellowish-brown. Haltere with relatively large, dark brown knob occupying half length; stem yellowish-brown.

Abdominal tergites sepia-brown on about basal two-thirds, apical third brownish-grey (this most evident in postero-dorsal view). First tergite brownish-grey, its lateral corners not darkened. Erect hairs pale brownish, recumbent hairs moderately long and shining pale yellowish to yellowish-white. Sternites more or less uniformly dark greyish with slight brown tinge, vestiture pale.

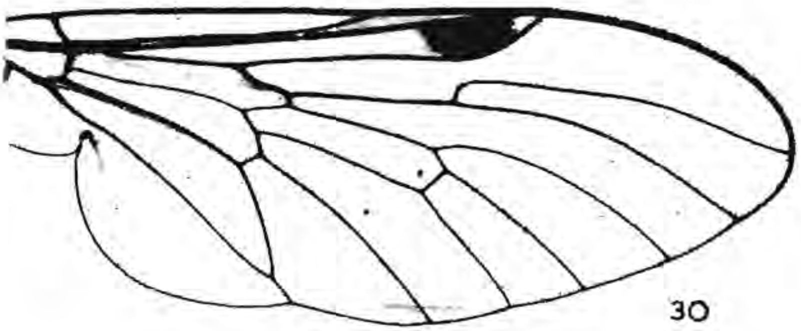


Fig. 30: Wing of *Chrysopilus ankaratrae* n.sp. ♂.

Wing (fig. 30) membrane uniformly slightly fumose, veins dark brown and strong. Stigma brown, elongate sub-oval, margins somewhat diffuse, filling apex of cell except for a small portion of distal corner. R_{2+3} quite strongly arched beneath stigma, in most specimens with a slight kink just before junction with costa, ending on costa about length of *m-cu* from R_1. Both R_4 and R_5 arched, diverging gradually from one another. M_3 index 1·18—1·20, mean for all specimens 1·19, discal cell fairly small.

Body length, 6·2—6·6 mm.

Wing size, 5·7 x 2·4 mm.

♀ Unknown.

Holotype ♂, 4 ♂♂ paratypes, Col de Mahafompeno, Ankaratra Range, eastern side, Ambatolampy district, central Madagascar, 2200-2400 m., 11-15.XII.57 (B. R. Stuckenberg).

Notes: This species was collected from the overhanging banks of a steeply-graded, small runnel deeply cut in a grassy slope, not far below the summit of the Ankaratra Massif, and above the highest limit of forest.

Chrysopilus kimoroensis n.sp.

Size medium. Dark brownish species with light brown legs, brown coxae which are thinly greyish pruinose, and brown palps. Coxal, pleurotergal and mesopleural hairs yellowish. Wing membrane slightly fumose (costal, subcostal and marginal cells more strongly so), centres of submarginal and posterior cells with faint, pale streaks. Stigma somewhat diffuse, but nearly or quite filling apex of cell; R_{2+3} not ending very close to R_1. Similar in appearance to *clemendoti* which has anterior pleurotergal tuft dark, wing hyaline and stigma not filling apex of cell. Very close and similar to *mundus* which future collecting may show to be only a form or subspecies of *kimoroensis; mundus* has palps luteous not brown, pleura quite strongly shining, and some slightly bluish, recumbent, lateral mesonotal hairs.

♂. Head index 1·20—1·22. Holoptic. Lower part of eye with smaller facets, separated by faint transverse impression. Lower frons with median groove and borders of groove blackish, elsewhere dark brownish-grey pruinose. Parafacials retreating inwards, dark greyish pruinose. Face of normal size but strongly swollen above, mostly dark brown, thinly dusted on greater upper part, more thickly dusted in narrow transverse band below and more broadly at sides below. Palps small, slender, slightly thickened apically, brown, with a few stiff, dark hairs. Proboscis luteous. Antennae blackish-brown. Orbits quite widely diverging at lower frons, very slightly concave opposite antennae. Ocellar tubercle prominent, chocolate brown, dark grey pruinose, ocelli in isoceles triangle with sides slightly larger than base; tubercle with a few minute hairs on hind part, some small ones behind. Occiput greyish, above with transverse, blackish marks along orbits. Lower occiput with pale brownish hairs, post-occipital setulae not extending into dark borders of upper part of occiput on each side of vertex.

Mesonotum and scutellum sepia-brown, notopleura, humeral calli and post-alar calli paler and more greyish. Erect hairs blackish; recumbent hairs very small on disc, reddish-yellow, longer and more golden to silvery yellow on sides and posterior part of mesonotum. Bristly notopleural hairs reddish. Recumbent scutellar hairs mostly slightly reddish yellow, golden on margin. Pleura dark brown, subshining, thickly greyish dusted, pteropleuron and mesopleuron somewhat darker (dark chocolate). Coxae concolorous with lower pleura. Legs light brown. Anterior and posterior pleurotergal tufts yellowish, middle tuft whitish. Coxal hairs pale yellowish. Haltere knob brown, stem dull, pale yellowish.

Abdomen mostly dark brown, more blackish apically, moderately shining, first tergite greyish with light sepia overtone, tergites 2-4 darker in middle than at sides. Tergites 2-6 with apical bands, occupying in midline a quarter to a third of width of each tergite, of pale yellowish and whitish recumbent hairs, these bands widening laterally; elsewhere these tergites with small, dark reddish recumbent hairs, second tergite with a few of the longer, pale hairs antero-laterally. First tergite with numerous, pale yellowish erect hairs, and quite long, whitish recumbent ones. Erect hairs on lateral parts of tergites pale brownish to dark brown, the darker ones prevalent on hind margins and becoming elsewhere more numerous on apical part of abdomen, erect hairs of tergites 6 and 7 all dark brown.

Wing (fig. 31) membrane slightly fumose in basal part, more strongly so apicad of discal cell and in costal, subcostal and marginal cells, submarginal and posterior cells

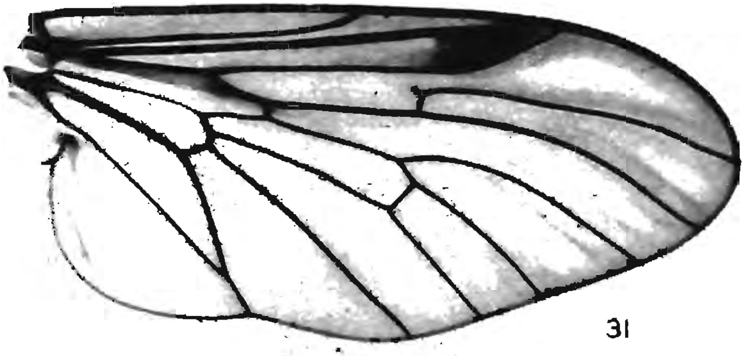


Fig. 31: Wing of *Chrysopilus kimoroensis* n.sp. ♂.

with very faint pale streaks. Stigma brown, somewhat diffuse on edges but filling apex of cell. R_{2+3} slightly arched beneath stigma, curving forward to meet costa nearly twice length of *m-cu* from apex of R_1. R_4 slightly undulant, R_5 arched. M_3 index 1·31—1·48, mean for all specimens 1·39, discal cell relatively large.

Body length, 6·8 mm.

Wing size, 5·4 x 2·7—5·6 x 2·4 mm.

♀ Unknown.

Holotype ♂, 2 ♂♂ paratypes, Kimoro River, eastern side of northern end of Andringitra Range, Ambalavao District, south-central Madagascar, 1680 m., 19 January 1958; 2 ♂♂ paratypes, Anjavidilava, 2020 m., 19-21 January 1958, other data as above (B. R. Stuckenberg).

Notes: All specimens were taken in upper montane forest on the eastern side of the Andringitra Massif. The Anjavidilava locality is at the upper limit of the forest.

Chrysopilus mundus n.sp.

Size moderately small. Possibly only an infraspecific form of *kimoroensis* with which it shares the following characters: generally dark species with pale pleurotergal and coxal hairs, wing slightly fumose, the outer cells with faint, clear, median streaks. Distinguished from *kimoroensis* by the luteous yellow palps, quite strongly shining pleura, presence of slightly bluish silvery recumbent hairs on lateral and posterior parts of mesonotum, in having the stigma not filling apex of cell and R_{2+3} ending about length of *m-cu* from apex of R_1.

♂. As described for *kimoroensis*, differing in that the palps are luteous with the tips narrowly brown. Head index 1·29. Pleura quite strongly shining, thinly greyish dusted, upper pleura chocolate brown. Legs pale somewhat yellowish brown. Recumbent lateral and posterior mesonotal hairs slightly bluish silvery. Stigma (fig. 32) elongate-oval, quite

dark brown, not quite filling apex of cell. R_{2+3} more distinctly arched beneath stigma, ending about length of *m-cu* from R_1. R_4 almost straight after basal angle, slightly arched, diverging only gradually from R_5. M_3 index 1·24.
Wing size, 5·5 x 2·6 mm.

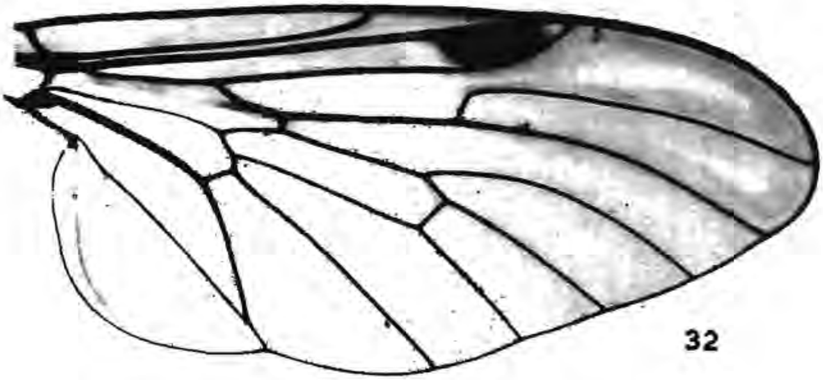


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Fig. 32: Wing of *Chrysopilus mundus* n.sp. ♂.

♀. Head index 1·05—1·10. Frons index 3·4—3·5, parallel-sided, light sepia brownish. Ocellar tubercle dark brown, ocelli in isoceles triangle, sides nearly 1½ times base. Recumbent mesonotal hairs very pale reddish to whitish, those on lateral and posterior parts slightly blue-tinged. Femora brownish-yellow, paler light brownish yellow in one specimen. First abdominal tergite with pale erect hairs, and shining whitish recumbent ones. Second and third tergites with shining, whitish, recumbent hairs in basal and apical bands, basal band irregular and incomplete, intermediate area with small, dark reddish recumbent hairs. Fourth tergite with recumbent hairs whitish on apical half, smaller and dark reddish on basal half. Intersegmental membrane between retractable segments dull orange. Wing with R_4 slightly undulant. M_3 index 1·14, 1·35.
Wing size, 4·9 x 2·4—5·3 x 2·5 mm.
Holotype ♂, 2 ♀♀ paratypes, Périnet, Tamatave District, east-central Madagascar, about 1000 m., 8 October 1958 (F. Keiser).
Notes: The two females are a little teneral, and have more distinctly yellowed legs than the male. At first sight they appear to belong to *madecassus merinanus*, form with dark pleura, but the lack of yellow in the abdominal colouring distinguishes them. Périnet is situated in the elongate tract of forest extending along the eastern escarpment of the island.

Chrysopilus clemendoti n.sp.

Size medium. A dark brownish species with brown coxae and femora, the femora sometimes slightly yellowed. Hairs in anterior pleurotergal tuft dark, middle tuft shining whitish. Wing without pattern; stigma reduced, of irregular shape, not filling apex of cell,

R_4 and R_5 somewhat diverging. If the femora are slightly yellowed *clemendoti* could be confused with *madecassus* (form with dark pleura), but the latter species can be distinguished by the shape of stigma, subparallel disposition of R_4 and R_5, and pale pleurotergal hairs. From *kimoroensis* and *mundus*, *clemendoti* is distinguished by the dark anterior pleurotergal tuft and coxal hairs, and by the shape of the stigma which in the other two species is larger and, even if somewhat diffuse, nearly or quite fills apex of cell.

♂. Head index 1·23—1·29. Holoptic; lower part of eye with slightly smaller facets than these just above faint impressed line that demarcates lower area. Orbits moderately diverging at lower frons, with definite concavities opposite antennae. Lower frons yellowish brown, median groove dark brown at lower end. Parafacials retreating inwards, with weakly developed ridges converging above face, brownish-grey pruinose. Face humped above, brown in ground colour, thinly pruinose. Suprafacial triangle twice as high as broad, very dark brown. Palps small, brown, slightly stouter apically, about $\frac{2}{3}$ height of face, hairs rather sparse, stiff, dark brown, longest being half length of palp. Lower occiput with brown and yellowish-brown hairs. Ocellar tubercle moderately prominent, dark brown with yellowish-brown pruinescence, some very short, dark hairs above and longer ones behind. Ocelli in equilateral triangle, anterior ocellus larger than others. Occiput dark greyish pruinose, brown tinged on upper section, narrowly blackish-brown above along orbits. Post-occipital fringe complete, but weak over the blackish-brown stripes on each side of uppermost part of occiput.

Mesonotum and scutellum matt, medium chocolate brown, former with paler, incomplete, narrow, dorsocentral lines conjunctive with pale lines in upper parts of transverse sutures. Erect mesonotal hairs short anteriorly, becoming progressively longer posteriorly, mostly reddish brown, those on post-alar ridge darker, bristly hairs on posterior part of notopleuron and those behind lower end of transverse suture, blackish or dark reddish; long hairs on anterior part of notopleuron light reddish to blackish. Recumbent mesonotal hairs very small over central part, becoming longer laterally and still longer on posterior section of mesonotum; the short central ones are reddish-brown (black in very oblique view), lateral ones are shining pale brownish; longer ones (on posterior part of mesonotum) are pale bluish. Scutellum with numerous, long, marginal, bristly hairs which are dark reddish-brown, and pale bluish recumbent hairs like those on hind part of mesonotum. Pleura subshining chocolate-brown, showing a thin, shining brown pruinescence in oblique view, upper pleura distinctly a little darker, anterodorsal edge of mesopleuron blackish, a blackish-brown area below haltere. Coxae concolorous with lower pleura, with dark brown hairs, front coxae usually a little paler. Legs yellowish-brown in most specimens, femora sometimes stronger brown. Appressed, scale-like hairs on femora quite numerous, very small, pale brownish-yellow. Anterior and posterior pleurotergal tufts dark brown, sometimes posterior tuft paler and more reddish than anterior, middle tuft with softer, shining, whitish hairs.

Abdomen dark brown, darker than mesonotum, second and third sternites dark luteous, corresponding tergites more darkly luteous laterally. Pleural membrane very dark, giving a dark lateral stripe to basal part of abdomen, this stripe running into a dark area beneath lateral end of first tergite, which is continuous with darkened area beneath haltere. Median parts of most tergites darker than sides. First tergite paler than others, laterally with obscure yellowish-brown tinge. Erect hairs numerous, longest medially on margins of tergites, brown, reddish-brown or pale yellowish. Tergites 2—6 with narrow bands of silvery recumbent hairs along posterior margins; similar hairs present on median part of first tergite. Tergites elsewhere with recumbent dark reddish hairs.

Wing (fig. 33) hyaline with very faint apical infuscation. Stigma light brown, small, irregular and somewhat variable in shape, not filling apex of cell. R_{2+3} diverging somewhat from R_1, quite sharply but evenly bent around stigma, not with discrete concavity beneath stigma, ending distant from apex of R_1 nearly twice length of *r-m*. R_4 and R_5 gently sinuous. M_3 index 1·19—1·35, mean for all males 1·27, discal cell relatively large.

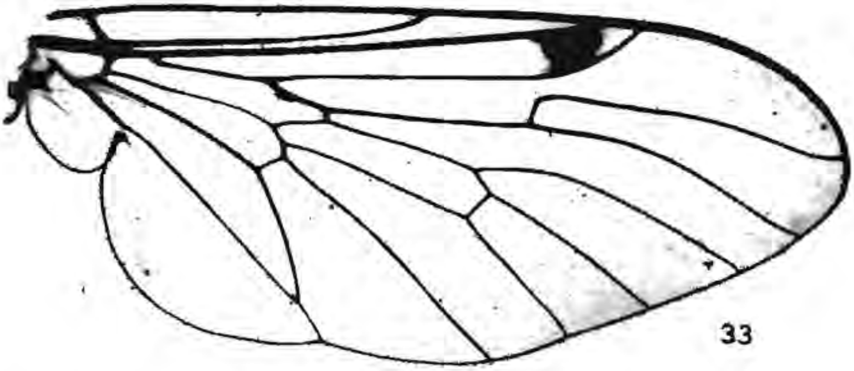

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Fig. 33: Wing of *Chrysopilus clemendoti* n.sp. ♂.

Body length, 5·6—7·2 mm.

Wing size, 5·5 x 2·3—5·5 x 2·5 mm.

♀. Head index 1·09—1·12. Frons relatively wide, index 3·15—3·30, higher than broad, parallel-sided or slightly divergent upwards, russet-brown with thin reddish overtinge, a narrow, greyish-brown band from eye to eye above antennae; transverse groover on lower frons poorly defined, median groove shallow, irregular, a small, vertical, blackish mark where median and transverse grooves intersect. Vertex a little sunken, ocellar tubercle therefore only moderately prominent in lateral view; ocelli almost in equilateral triangle, sides slightly longer than base, each ocellus with dark border.

Thoracic colouring and vestiture as in ♂. Abdominal colouring and vestiture also similar, except that silvery recumbent hairs are present also on antero-lateral parts of second and third tergites, also a few in same position on fourth tergites. M_3 index 1·43.

Wing size, 5·5 x 2·6—5·8 x 2·8 mm.

Holotype ♂, paratypes 5 ♂♂, 2 ♀♀, Roussettes Forest Station, Montagne d'Ambre, Diego-Suarez District, northern Madagascar, 1000 m., 23 November—4 December 1958 (B. R. Stuckenberg). 2 ♂♂ paratypes, Montagne d'Ambre, 26 May 1958 (F. Keiser).

Notes: The thoracic colouring and dark pleural stripe of the abdomen and other characters indicate this species to be related to the sympatric *madecassus*, and more distantly with *sucini* and *superbus*. It is the most darkly coloured member of the group, and in its colouration, vestiture and general appearance resembles *kimoroensis* and *mundus*. Taken from luxuriant herbage in the forest. Named in honour of Mr. Clemendot of the Provincial Forestry Service in Diego-Suarez.

Chrysopilus madecassus n.sp.

I include under this name a number of specimens which show variation in several features. The male genitalia and shape of the stigma and apical part of R_{2+3} distinguish specimens from Montagne d'Ambre from those taken elsewhere in Madagascar; and the thoracic pleura may be bicolorous, or unicolorous as in *indris* and one of the forms of *mutabilis*. Both colour forms occur on Montagne d'Ambre, and both have been found to the south though the one with unicolorous pleura is uncommon there. The genitalia of both colour forms agree within each of the two geographical areas mentioned. I have had to make an arbitrary decision as to whether the division of the material into two allopatric sections on the basis of genitalic and wing characters segregates species or subspecies, and prefer to consider, provisionally, that all the specimens are conspecific and fall into two subspecies each with two colour forms. The nominate subspecies is the one occurring on Montagne d'Ambre and its typical form is with unicolorous pleura; the other subspecies, *merinanus*, occurs elsewhere in Madagascar, and its typical form is the commoner one with bicolorous pleura. Another character which varies is the colour of the palps which in a few specimens are brownish instead of yellowish or yellowish with dark tips. Such specimens are referred to in a footnote to couplet 2 of the key.

The species is related to *clemendoti*, *sucini* and *superbus; clemendoti* is superficially similar to the sympatric, typical colour form of the nominate subspecies of *madecassus*, but differs in having the anterior pleurotergal tuft and coxal hairs dark, and the stigma of another shape.

Size medium. Palps yellowish, often the tip darkened, rarely luteous. R_4 not or slightly sinuous, arching subparallel to R_5. Antennae dark brown. All pleurotergal and coxal hairs pale yellowish. Coxae yellow, rarely yellowish-brown. Abdominal venter yellowish to luteous in varying degrees but on at least the basal three segments. Pleural membrane of abdomen darkened, horizontal stripe which ends anteriorly in an intensely dark mark immediately beneath lateral end of 1st tergite, behind the haltere. Recumbent mesonotal hairs either yellowish, greenish-yellow or bright pale bluish. Pleura either dark brownish with thin, greyish pruinescence, or bicolorous, the upper pleura (mesopleuron and pteropleuron) dark brown, sometimes dark chocolate, contrasting with lower pleura which are yellowed, and with yellow coxae. *Nominate subspecies:* R_{2+3} ending further from R_1, space between them about $1\frac{1}{2}$ times length of *m-cu* crossvein; stigma shorter, not filling apex of cell (fig. 34). Montagne d'Ambre. Male genitalia as in fig. 36. Subspecies *merinanus* n.subsp.: R_{2+3} curving more strongly around stigma to end close to apex of R_1, separated by about length of *m-cu* crossvein; stigma more elongate oval, about filling apex of cell (fig. 35). Madagascar south of Montagne d'Ambre. Male genitalia as in fig. 36.

madecassus madecassus, typical colour form.

♂. Holoptic. Head index 1·26—1·34. Lower third of eye with reduced facets, separated from upper part of eye by slight, linear, transverse impression. Lower frons and parafacials dark brownish-grey pruinose. Parafacials retreating inwards below, with distinct oblique ridges above, these ridges meeting above face. Face humped above, yellowish-brown except above where there is a dark brown area. Palps small, shorter than height of face, pale yellow with brownish tips, sparsely haired, some of the apical hairs brown, remainder shining whitish. Mouthparts pale yellowish. Middle antennal segment brown, basal and apical segments dark brown. Ocellar tubercle very slightly elevated, very dark brown with thin brownish-grey pruinescence; ocelli small, in isoceles triangle, sides slightly longer than base; tubercle very short-haired above and behind. Hairs on lower occiput pale yellowish or brownish, also those in post-occipital fringe which is sparse but attains vertex. Occiput grey, slightly darkened above along orbits adjacent to vertex, not strongly darkened here as in *clemendoti*. Orbits moderately diverging opposite lower frons, with distinct but short concavity opposite antennae.

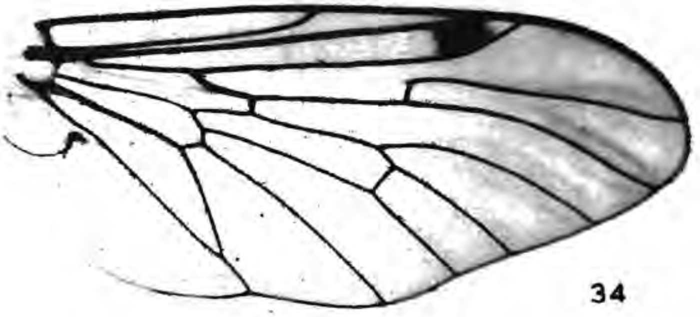

Fig. 34: Wing of *Chrysopilus madecassus madecassus* n.sp. ♂.

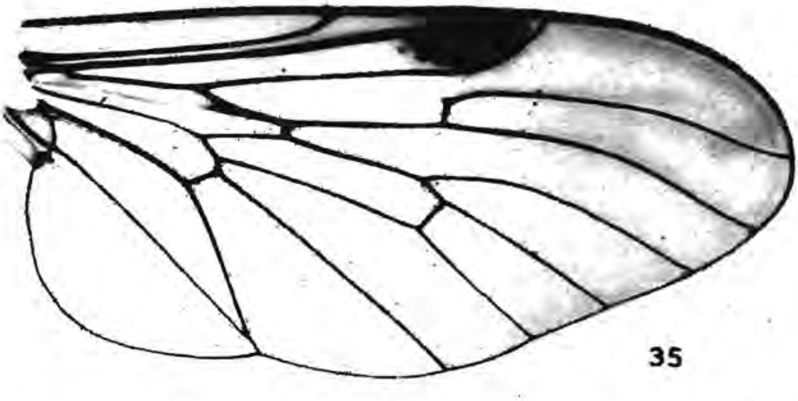

Fig. 35: Wing of *Chrysopilus madecassus merinanus* n.sp. ♂, specimen from Périnet.

Mesonotum sepia brown, with pale, incomplete, dorsocentral lines, and streaks in transverse sutures. Pleura moderately shiny, thinly greyish pruinose, dark brown, upper edge of mesopleuron dark chocolate; coxae and femora pale yellowish, tibiae and tarsi brownish, progressively darker apicad; lower sides of trochanter-femur joints narrowly blackened. Erect hairs of mesonotum brownish, becoming larger posteriorly, scutellum fringed with many long, reddish-brown hairs; bristly hairs on notopleuron reddish-yellow, a few blackish in some specimens; a few dark, bristly hairs on lateral mesonotum behind lower end of transverse suture and on post-alar callus. Recumbent mesonotal and scutellar hairs quite long, mainly shining pale bluish, also shining whitish and yellowish-white. Pleurotergal hairs all pale yellowish, also mesopleural and all coxal hairs. Spurs light brown with darkened tip. Haltere with brownish knob and dull, pale yellowish stem.

Abdominal venter yellowish to luteous in varying degrees, so coloured on at least basal three segments but usually on first five segments, sometimes a reddish tinge imparted by fluid contents of abdomen. Pleural membrane and lateral borders of tergites darkened, forming a horizontal stripe that terminates anteriorly in a very dark mark immediately below lateral end of first tergite and behind haltere. First tergite yellowish with thin grey overtone, with obscure brownish darkening medially; second tergite brownish yellow on sides, extensively more brown medially; third tergite with similar distribution of colour, but more brownish on sides and darker medially; fourth tergite dark brown with slight, indefinite, antero-lateral, paler marks, remaining tergites blackish-brown. Erect hairs pale at base of abdomen, dark ones on posterior borders of intermediate tergites, those on tergites 5—7 all dark. Recumbent tergal hairs shining, pale bluish or whitish, in bands on posterior borders of tergites 2—6, these bands about a third of width of tergite and not extending to lateral border, second tergite in addition with some of these pale hairs anteriorly; other recumbent hairs on tergites are dark reddish and much smaller, occurring in a wide median strip, absent on first tergite. Genitalia as in fig. 36.

Wing greyish with slight infuscation apically, submarginal and posterior cells with very faint, paler, median streaks. Stigma brown, without sharply defined margins, inner margin straight to slightly concave, apical end not filling apex of cell where there is a clear area. R_{2+3} bent forwards, not with a discrete arch beneath stigma, marginal cell widest across stigma but not abruptly widened there, end of R_{2+3} separated from R_1 about $1\frac{1}{2}$ times length of *m-cu*. R_4 slightly sinuous about an almost straight line, R_5 arching away from R_4. M_3 index 1·32—1·40, mean 1·36, discal cell relatively narrow.

Body length, 6·7—7·5 mm.

Wing size, 4·7 x 2·5—4·8 x 2·2 mm.

♀. Head index 1·04—1·09. Frons relatively narrow, index 3·43. Greater part of frons with dark brownish undertone and a slightly reddish brown overtone which does not extend into median groove. Immediately above antennae is a transverse greyish mark from orbit to orbit, interrupted medially by groove. Ocellar tubercle dark brown, ocelli as in ♂. Hairs in post-occipital fringe dark. Vertex brownish on each side, with short, dark hairs irregularly arranged. Face brownish, darkened above. Coxae slightly brownish yellow, very thinly greyish pruinose. Abdominal venter irregularly luteous; tergites 2—4 dark sepia brown with hind margins narrowly paler, vestiture as in ♂, shining whitish-blue hairs on posterior bands, shorter dark reddish hairs elsewhere. First tergite darkish brown with yellowish tinge laterally, recumbent hairs numerous, long, shining whitish or whitish-blue. M_3 index 1·08—1·52, mean 1·27.

Wing size, 5·2 x 2·5—5·5 x 2·5 mm.

Holotype ♂, 3 ♂♂, 4 ♀♀ paratypes, Roussettes Forest Station, Montagne d'Ambre, Diego-Suarez District, northern Madagascar, 23.XI-4.XII.1957, 1000 m. (B. R. Stuckenberg).

Notes: Taken in montane forest.

madecassus madecassus, form with bicolorous pleura.

♂. Pleura bicolorous, upper pleura chocolate-brown, sternopleuron and hypopleuron yellowish except narrowly above where they are brown. Antennae unicolorous brownish. M_3 index 1·18.

Wing size, 4·8 x 2·3 mm.

Paratype ♂, Montagne d'Ambre, 26 May 1958 (F. Keiser).

Notes: Sympatric with typical form of nominate subspecies, but taken at the end of the summer. The single specimen is in poor condition, and I am not entirely convinced that it belongs to the same species. The specimen is made a paratype as the latest International Code does not recognise infraspecific taxa lower than subspecies.

madecassus merinanus n.subsp.

Diagnostic characters given above. Typical colour form of this subspecies with bicolorous pleura. Male body length, 5·8—7·1 mm.; wing size, 4·3 x 1·9—5·3 x 2·3 mm.; head index 1·34; M_3 index 1·18—1·52; mean, 1·34. Female wing size, 4·5 x 2·1—4·9 x 2·3 mm. Head index, 1·10. Frons index, 3·5. M_3 index, 0·95—1·34, mean 1·13. *Holotype* ♂, paratypes 1 ♀, 2 ♂♂ (1.XII.57), 1 ♂ (27.XI.58), 2 ♂♂ (10.XI.57), 1 ♂ (2.X.58), 1 ♂ (8.X.58), Périnet, 1000 m., east-central Madagascar; 2 ♂♂ Soanierana-Ivongo, 10.XI.57,

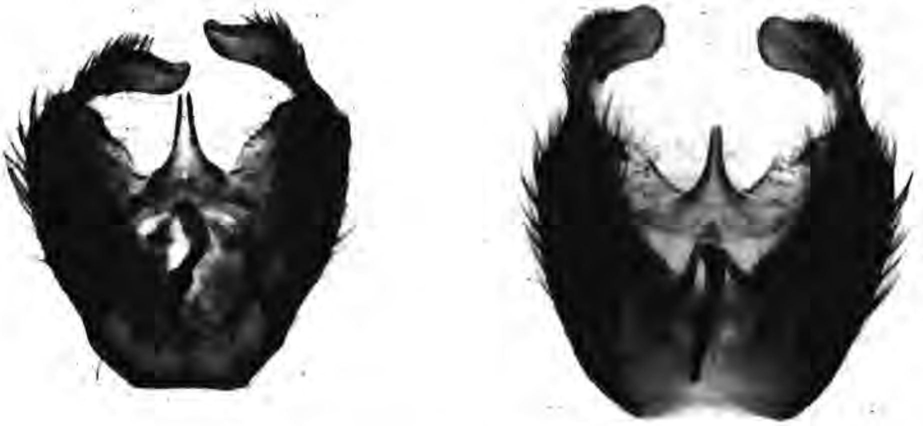

Fig. 36: Male genitalia of *Chrysopilus madecassus*n. sp., (left) nominate subspecies, and (right) ssp. *merinanus* (Périnet specimen).

east coast; 8 ♂♂, Famponambo, 27.XI.57 (all coll. F. Keiser); 1 ♂, 1 ♀, coastal forest near Fenerive, December 1955 (B. R. Stuckenberg); 1 ♂, 1 ♀, Ambadikala, Ranonena, Brickaville dist., September 1954, (*A.R.*); 2 ♂♂, 1 ♀, Marojejy Ouest, 1300 m., Sambava dist., IX-X-59 (P. Soga); 1 ♂, Mandritsara, February 1950 (J. Vadon).
Notes: This subspecies has a wide range both longitudinally and altitudinally, and shows variation which probably is correlated. Specimens from Périnet are somewhat darker and have less brightly coloured mesonotal vestiture than those from coastal parts; also they have a larger stigma.

madecassus merinanus n.subsp. Atypical form with dark pleura.
Body length, 5·5—6·6 mm. Wing size, 4·8 x 2·2—5·5 x 2·4 mm. M_3 index 1·54.
Paratypes, 3 ♂♂, Ambatolahy, Fianarantsoa Dist., 14.IX.58 (F. Keiser).
Notes: The stigma is more elongate than in any other specimens of *madecassus*. In view of the geographical isolation of these specimens it is possible that they represent another subspecies.

Chrysopilus sucini n.sp.

Size small. Upper pleura intensely dark brown, contrasting strongly with yellowish lower pleura, coxae and legs; abdomen largely yellowish, only the apical three segments darkened. Vein R_4 not sinuous, basally subparallel to R_5, thereafter diverging slightly. Stigma pale brown to yellowish-brown, diffuse. All body hairs pale. Haltere yellowish. Pleural membrane of abdomen darkened. Easily recognised by the predominantly yellowish colouring contrasting with dark upper pleura; related to *madecassus* and *superbus*.
♂. Head index 1·08—1·27, mean for all males 1·18. Holoptic. Facets in lower part of eye a little smaller than those in upper part, separated by an almost imperceptible line. Lower frons deeply grooved, yellowish-brown pruinose. Parafacials retreating inwards a little, with strong oblique ridges meeting above face. Face relatively small, tumid, a little flattened above, in profile its anterior edge only slightly curved; brownish with slightly yellowish-brown pruinescence. Palps small, slender, yellowish with darkened tips, bearing a few stiff, pale brownish hairs. Mouthparts luteous. Antennae slightly yellowish brown. Ocellar tubercle fairly prominent, ocelli in triangle having sides about 1½ times length of base; tubercle and upper frons yellowish-brown pruinose; tubercle with some short, stiff, dark hairs. Occiput greyish, above with a narrow, irregular darkening along short length of orbit. Lower occiput with pale yellowish hairs. Postcocular fringe attaining vertex.

Mesonotum and scutellum brown, the dorsocentral lines, transverse sutures and humeri weakly yellowed. All erect hairs yellowish. Recumbent hairs abundant, dark when seen in anterior view, shining pale yellowish, whitish and very pale bluish in posterodorsal view. Pleura rich chocolate-brown on more than upper half, grading rapidly to lighter yellow on lower parts of steropleuron and hypopleuron, coxae and femora lighter yellow. All coxal, mesopleural and pleurotergal hairs pale. Haltere uniformly yellowish.

Abdomen predominantly yellowish, the sternites more strongly so. The tergites after the third become progressively more brown on the basal two-thirds. Lateral edges of tergites narrowly brown, pleural membrane also brown, giving abdomen a thin lateral stripe that continues over lower end of first tergite and onto dark pleura. All erect hairs yellowish. Recumbent hairs rather woolly, dark reddish-brown on basal half of tergites, shining whitish or whitish-yellow on posterior part. Sternites bright yellow, the sixth and seventh with brownish tinge, all hairs pale.

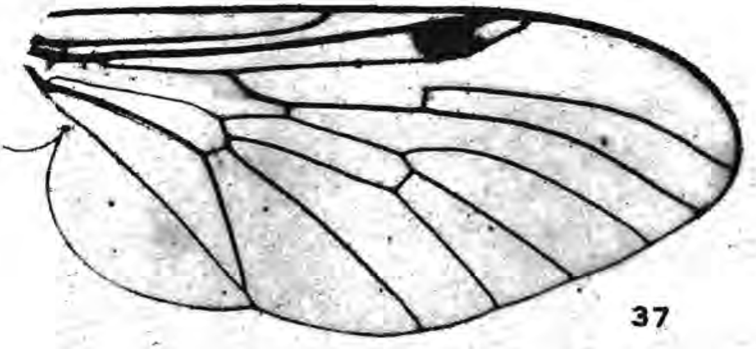

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Fig. 37: Wing of *Chrysopilus sucini* n.sp. ♂.

Wing (fig. 37) membrane uniformly greyish-hyaline, apex not darkened. Stigma weak, pale brown to yellowish-brown, diffuse, not filling apex of cell. R_{2+3} gently arching beneath stigma and ending on costa about length of *r-m* from R_1. R_4 angled basally, arched, gradually diverging from R_5 which also is arched. Discal cell relatively small and short, M_3 index 1·10—1·29, mean of five specimens 1·21.

Body length, 4·4—6·1 mm.

Wing size, 3·75 x 1·7—5·2 x 2·3 mm.

♀. Head index 1·04—1·10. Frons higher than broad, index 3·0—3·1, diverging upwards slightly, mainly rich purplish brown as far back as level of posterior ocelli, narrowly paler along orbits, lower part of frons with a greyish transverse band from orbit to orbit, just above antennae. Face brown, palps with distinctly darkened tips. Ocellar tubercle greyish-brown, ocelli in triangle having sides about 1½ times length of base, tubercle with some very short, dark hairs above. Vertex with some scattered dark hairs on each side.

Abdomen less flavous than in ♂, tergites 2—4 more strongly brown with broadly yellow hind margins, the darkening probably due to drying of contents. Retractable segments yellow-brown, paler on posterior margins. Recumbent hairs differing in that some pale bluish and whitish ones occur on anterior halves of intermediate tergites in addition to dark ones. Pleural membrane conspicuously darkened. M_3 index 1·04—1·32, mean for all females 1·20.

Wing size, 4·4 x 2·1—4·8 x 2·2 mm.

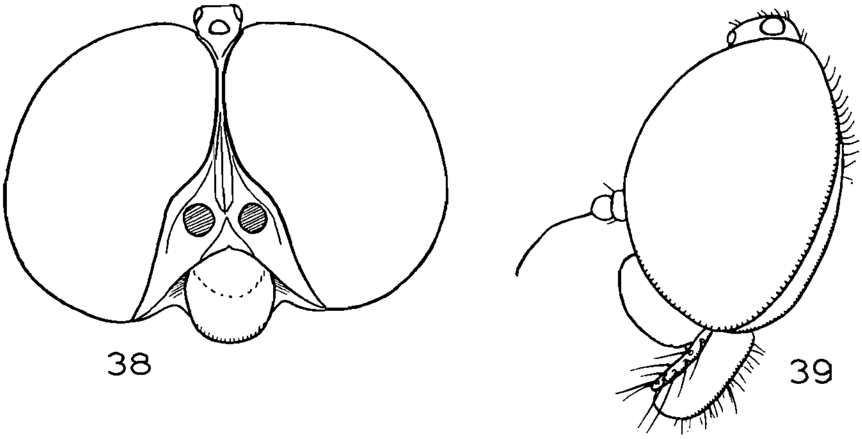
Holotype ♂, 17 ♂♂, 6 ♀♀ paratypes, Roussettes Forest Station, Montagne d'Ambre, Diego-Suarez District, northern Madagascar, 1000 m., 23.XI-4.XII.1957 (B. R. Stuckenberg).

Notes: Evidently a common species at the type locality during the early Summer. The type series was collected on low shrubbery in indigenous forest.

Chrysopilus superbus n.sp.

Size small. Antennae, face, palps and mouthparts brown. Coxae brownish, femora yellowish to yellowish-browh. Pleura entirely chocolate brown. Abdomen with long, shaggy, shining recumbent hairs which are coppery brown on basal half and silvery-blue on apical half of each tergite. Stigma broad; R_{2+3} strongly bent around stigma to end very close to apex of R_1. Mesonotum and scutellum with recumbent, scale-like, brilliantly blue hairs. ♂ Head comparatively small, with prominent ocellar tubercle, markedly projecting face, and antennae placed approximately at level of middle of eye. ♀ Frons relatively narrow. This beautiful species appears to be most closely related to *clemendoti* and *sucini*.

♂. Not quite holoptic, the eyes approaching one another very closely, at their closest separated by less than transverse diameter of anterior ocellus. Area of reduced facets occupying a proportionately greater part of eye than normal, almost one-half of eye, upper part with relatively coarse facets which are about twice the size of lower facets, the two parts separated by a distinct transverse depression. Head (figs. 38, 39) comparatively small, index 1·12, lower part of occiput and genae narrowly visible in lateral view. Lower frons with deep, velvety black, median groove, with yellowish-brown pruinescence above each antennae. Antennae brownish-black, third segment almost black, placed relatively high up, at about level of middle of eye. Face tumid, prominently protruding, hardly flattened above, brownish, darker in median line, with thin pruinescence. Parafacials brownish-grey pruinose, retreating inwards strongly, an oblique ridge from each side meeting below antennae. Palps slender, small, brown, with stiff, brown hairs. Mouthparts brownish with brown hairs. Ocellar tubercle prominent, ocelli large, arranged in triangle having sides 1½ times length of base; ocelli brown, tubercle and lower frons brownish-grey pruinose. Orbits markedly concave opposite antennae, not diverging much thereafter, facial area generally small. Occiput brownish-grey, a short length of upper orbits adjacent to vertex narrowly margined with blackish-brown; lower occiput with dark brown hairs, postocular setulae not extending onto dark orbital marks on upper occiput.



Figs. 38, 39: *Chrysopilus superbus* n.sp., ♂ head in frontal and lateral views.

Mesonotum and scutellum brown, former faintly paler in dorsocentral lines and transverse sutures. Erect hairs not numerous, short except on scutellum and posterior mesonotum, all whitish or pale yellowish. Recumbent hairs abundant, scale-like, blackish when viewed posteriorly, brilliant electric-blue in dorsal view. Bristly notopleural hairs pale reddish. Pleura entirely chocolate-brown, very dark on mesopleuron. Femora yellowish to yellowish-brown. Coxal and mesopleural hairs brownish; pleurotergal hairs shining, pale brownish, the middle tuft paler than the others. Halteres brownish, basal part of stem yellowish-brown.

Abdomen apparently dark brown in ground colour, tergites extensively covered with long, shaggy, shining hairs which are dark reddish-brown on basal half of tergites and bright silvery-blue on apical half. Erect hairs brownish. Sternites sepia brown with dark hairs.

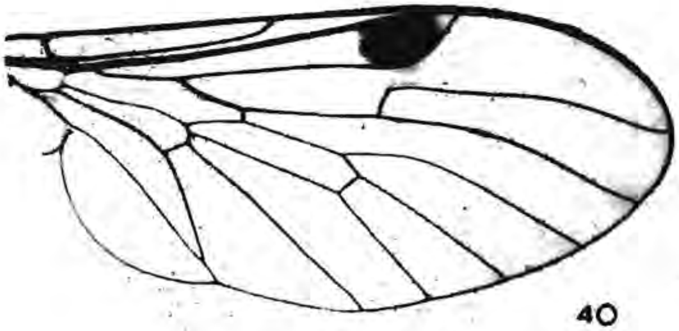


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Fig. 40: Wing of *Chrysopilus superbus* n.sp. ♀.

Wing like that of ♀ shown in fig. 40, greyish-hyaline in basal half, slightly pruinose over apical part up to level of base of R_4 and apex of discal cell, clear streaks present in both submarginal and first three posterior cells. Stigma brown, suboval, not quite filling apex of cell. R_{2+3} strongly bent around stigma and ending on costa very close to R_1 (about length of *r-m* which is somewhat short in this species). R_4 not angled basally, arched, slightly divergent from R_5 which also is arched. Apical section of M_3 subequal to preapical, index 1·11, discal cell small and narrow.

Body length, 4·8 mm.

Wing size, 4·2 x 1·9 mm.

♀. Head index 1·07—1·11. Frons relatively narrow, higher than broad, sides subparallel, index 3·55—4·00, dark sepia-brown with a transverse brownish-grey band above antennae which is interrupted medially by black groove. Ocelli in triangle with sides about 1¼ times length of base, tubercle with brownish-grey pruinescence. Some bristly, dark hairs on vertex are almost as long as tubercle. In both female specimens the abdomen is extensively denuded, revealing tergites 2—4 to be shining brown on the basal half to two-thirds, matt

sepia-brown posteriorly. One specimen has vestiges of brightly coloured, woolly hairs which are like those of male. M_3 index 1·05 and 1·12.
Wing size, 3·6 x 1·8—4·4 x 2·2 mm.
Holotype ♂, Sahasoa River, Famponambo, Maroantsetra District, northern Madagascar, 80 m., 26-29.III.1958 (B. R. Stuckenberg); 1 ♀ paratype, Ambodivohangy, Maroantsetra District, northern Madagascar, March 1950 (J. Vadon); 1 ♀ paratype, Andranofotsy, Tamatave District, 1 May 1958 (F. Keiser).
Notes: This species is known only from forested, hilly country close to the sea.

Chrysopilus megacephalus n.sp.

Size large. One of a species group characterised by bicolorous pleura (upper pleura dark chocolate-brown, lower pleura yellowish or reddish-yellow), R_4 strongly sinuous, stigma sharply defined, widely oval, R_{2+3} arched beneath the stigma (fig. 41), apical section of M_3 much shorter than preapical, vein issuing from apex of anal cell unusually long, and abdomen with numerous, dark, erect hairs. Only the male sex is known of the species in this group, and in all the species the head is noticeably enlarged. This species and *lokobiensis* are vicariants, *megacephalus* being of larger size and having abdominal sternites extensively luteous. Differing from *vespertinus* in larger size and dark anterior and posterior pleurotergal tufts.
♂. Holoptic. Head relatively enlarged, though not correspondingly deep in long axis of body, index 1·28, eyes bulging predominently on the sides. Lower part of eye with facets slightly smaller than in upper part, a very thin, slightly impressed line separating the two areas. Lower frons dark brownish-black centrally, laterally with pale yellowish-brown pruinescence. Parafacials retreating inwards strongly, with distinct oblique ridges that meet between antennae and face, yellowish-grey pruinose on an underlying dark brown. Face relatively small, laterally compressed, protuberant, abruptly flattened above, slightly yellowish-brown with thin dust, darker at base above. Palps small, pale yellowish, slightly browned apically, with very few hairs all of which are stiff and brownish. Proboscis luteous, with pale hairs. Antennae proportionately small, apical segment dark brown, middle segment paler. Orbits moderately diverging at lower frons, distinctly concave opposite antennae. Ocellar tubercle only moderately prominent, ocelli fairly large and arranged in triangle with sides slightly longer than base, tubercle and upper frons (especially latter) with light brownish pruinescence as on lower frons. Occiput concave, inconspicuous owing to great development of eyes, greyish with sepia tinge, except above where an elongate dark brown strip borders upper part of each orbit. Lower occiput with pale yellowish to pale brownish, shining, rather stiff hairs; post-occipital setulae extending onto dark borders on upper part of occiput, the single series of setulae expanding into a small scattered group on each side below vertex.

Mesonotum and scutellum sepia-brown, humeri paler. Erect hairs brown to light brown, bristly; recumbent hairs rather sparse, shining, pale reddish, very pale bluish and pale yellowish, longer on posterior part of mesonotum and on scutellum. Bristly notopleural hairs reddish. Pleura conspicuously bicolorous, dark chocolate-brown above, grading abruptly into slightly reddish-yellow below and on coxae. Anterior and middle femora yellowish, posterior femora pale brown; tarsi becoming darker brown apically. Anterior and posterior pleurotergal hair tufts dark brown, hairs of middle tuft finer, softer and pale yellowish. Mesopleural hairs long, yellowish. Hairs of anterior coxae mixed pale brown and whitish, on middle coxae pale and medium brown, on hind coxae very sparse, medium brown. Haltere knob brown, stem dull pale yellow.

First abdominal tergite opaque, slightly yellowish brown, more grey-brown medially. Tergites 2-4 yellowish-brown on posterior third (these paler marks conspicuous to naked eye), tergite 2 in addition yellowish-brown laterally except narrowly along margin where it is dark, these three tergites elsewhere brown and becoming progressively darker posteriorly. Tergites 5-6 dark chocolate-brown except for slightly paler posterior third on fifth tergite, seventh tergite uniformly blackish-brown. Sternites 1-4 clear luteous, apical sternites progressively darker. Erect hairs on tergites stiff and black, especially numerous, large and erect laterally. Recumbent hairs absent on lateral parts of tergites, on tergites 2-5 the dark brown part with small dark brown and dark reddish-brown hairs, the apical paler part with fine silvery or very pale bluish-white hairs. A few very small, pale hairs on hind half of sixth tergite. Sternal hairs mostly stiff and dark, second and (to lesser extent) third sternites with some shorter, finer pale hairs. Pleural membrane greyish-yellow. Lateral margins of tergites narrowly darkened, uniting to give abdomen a narrow horizontal stripe which includes lower corner of first tergite and continues into darkened upper pleura.

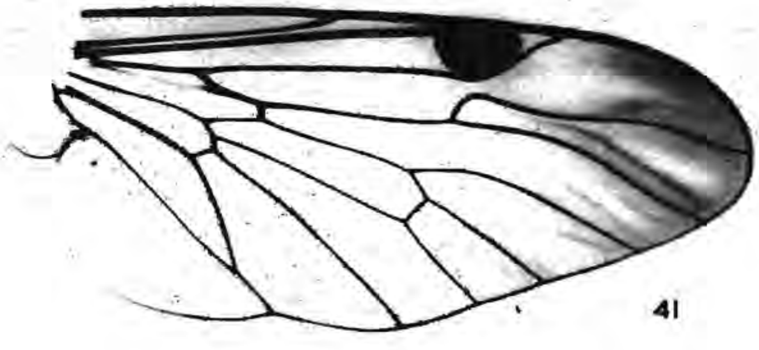

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Fig. 41: Wing of *Chrysopilus megacephalus* n.sp. ♂.

Wing (fig. 41) membrane very slightly fumose, with an apical brownish tinge, elongate clear streaks present in the two submarginal and first three posterior cells. Costal cell slightly yellowed apically. Stigma darkish brown, strong, sharply defined, broadly and irregularly suboval, not filling apex of cell. R_{2+3} strongly arched beneath stigma, its poststigmal section sinuous before terminating on costa at a distance from R_1 about twice length of *r-m*. Both R_4 and R_5 strongly undulant, approaching one another closely over basal third of second posterior cell. Apical section of M_3 much shorter than pre-apical, index 1·80,

discal cell large and elongate. Vein issuing from apex of anal cell exactly half length of apical part of M_3.
Body length, 9·2 mm.
Wing size, 6·5 x 2·9 mm.
♀ unknown.
Holotype ♂, Roussettes Forest Station, Montagne d'Ambre, Diego-Suarez District, northern Madagascar, 1000 m., 23.XI-4.XII.1957 (B. R. Stuckenberg).
Notes: The specimen was swept from lush herbage on a shaded bank at the side of a water furrow, in well-preserved montane forest.

Chrysopilus lokobiensis n.sp.

Size medium. A vicariant of *megacephalus*, with the group characters as given under that species. Differing from *megacephalus* in smaller size and extensively blackish abdomen, and from *vespertinus* in the much darker abdomen and dark anterior and posterior pleurotergal tufts.

♂. Head index 1·21—1·23. Holoptic. Lower part of eye with facets only half as large as those in upper part, a very narrow, impressed line between. Lower frons blackish-brown with pale yellowish-brown pruinescence. Parafacials rather narrow, retreating inwards very strongly, with oblique ridges that meet between antennae and face, ashy-grey pruinose. Face laterally compressed, inflated, not flattened above, mostly yellowish-brown, a brown mark above. Palps small, dull yellowish, with short, stiff, dark hairs. Proboscis reddish-yellow. Antennae more or less unicolorous brownish. Orbits only moderately diverging, the facial area correspondingly small, marked orbital concavities opposite antennae. Ocellar tubercle relatively inconspicuous, blackish with shifting yellowish-brown pruinescence; ocelli in triangle with sides slightly longer than base. Occiput dark greyish, narrowly paler along lateral orbits, upper orbits narrowly bordered with very dark brown. Lower occiput with pale yellowish-brown to brownish, stiff hairs. Postorbital setulae extending across dark marks on upper occiput.

Mesonotum and scutellum brown. Erect mesonotal and scutellar hairs brown (in some positions with slight reddish tinge), rather short anteriorly. Recumbent hairs coppery-red when viewed from above, pale blue in oblique view. Bristly notopleural hairs dark brown. Pleura conspicuously bicoloured, dark brown above (very dark on upper edge of mesopleuron), changing rapidly to dull yellowish on lower pleura. Coxae and femora yellowish, tibial spurs dull yellow with brown tips, tarsi darkening apicad. Hairs in anterior and posterior pleurotergal tufts dark brown and bristly, those in middle tuft softer and shining whitish. Hairs on upper edge of mesopleuron long and dark. Anterior coxae with pale hairs, middle coxae with hairs mostly pale, a few brown, hind coxae sparsely haired, hairs mostly brown, a few pale. Haltere knob dark brown, stem yellowish-brown.

First abdominal tergite greyish-brown, lateral corners darkened. Tergites 2-6 chocolate-brown, approximately the apical third dark greyish (this most evident in oblique view). Tergites 7-8 uniformly dark chocolate brown. Sternites variable in colouration, but never more than first three luteous, remainder varying from dark brown slightly admixed with yellow to blackish-brown. Tergites with erect hairs long, dark, bristly on sides and hind margins, much shorter medially. Recumbent hairs woolly, reddish-brown on chocolate parts of tergites, pale shining bluish on grey posterior bands. Second sternite with some pale hairs medially, otherwise sternites with dark hairs.

Wing (fig. 42) greyish hyaline, the apex distinctly fumose, a clear streak in second posterior cell. Stigma dark brown, strong, deep, not quite filling apex of cell. R_{2+3} arched beneath stigma, ending on costa a distance from R_1 a little greater than length of *r-m*. R_4 strongly sinuous, R_5 moderately so. Apical section of M_3 distinctly shorter than pre-apical, index 1·42—1·66, mean 1·53, discal cell rather narrow. Vein issuing from apex of anal cell relatively long, ratio to apical section of M_3 being 2·40—2·58 (mean 2·48).

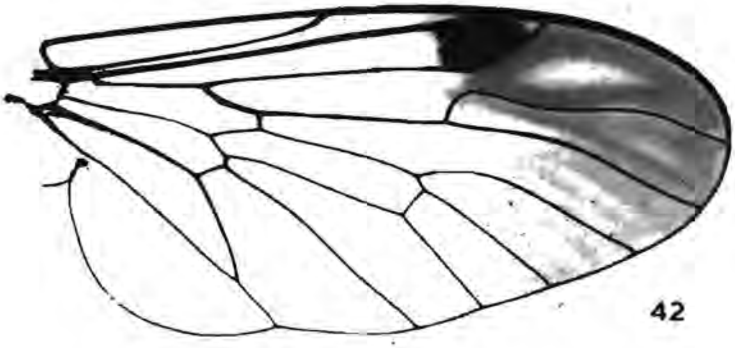
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Fig. 42: Wing of *Chrysopilus lokobiensis* n.sp. ♂.

Body length, 7·2—7·3 mm.
Wing size, 4·7 x 2·3—5·2 x 2·4 mm.
♀ Unknown.
Holotype ♂, 5 ♂♂ paratypes, Lokobé Forest, Nossi-Bé Island, Sambirano District, northern Madagascar, 9-23.XI.1957 (B. R. Stuckenberg).

Notes: Swept from shrubbery over a very small stream at a clearing in the forest. Nossi-Bé is the largest of several small islands off the west coast of northern Madagascar. The intervening strait is very shallow, and cliff-cutting around the islands and drowned valleys indicate recent subsidence which submerged the land that formerly connected these islands to Madagascar.

Chrysopilus vespertinus n.sp.

Size medium. Related to the *megacephalus—lokobiensis* pair, and sharing the group characters given under the former species. Distinct from *megacephalus* in smaller size and pale pleurotergal hairs, and from *lokobiensis* in the latter character and brownish abdomen. Only the somewhat discoloured, rubbed and laterally compressed holotype is available.

♂. Holoptic. Facets in lower part of eye only slightly smaller than those in upper part, the two areas divided by a weakly impressed line. Frons and parafacials discoloured. Parafacials retreating inwards very strongly, with oblique ridges on upper part that meet between antennae and face. Face not much laterally compressed, rather tumid, a little flattened above, brownish. Palps small, cylindrical, luteous (probably yellowish in life), with a few stiff, pale hairs. Mouthparts reddish-yellow. Antennae brown. Orbits not much diverging at lower frons, facial area relatively reduced; each orbit distinctly concave opposite antennae. Occiput discoloured. Hairs on lower occiput brownish.

Mesonotum and scutellum brownish, largely denuded. Erect hairs stiff, brownish. Recumbent hairs small, mainly pale reddish-yellow when viwed from above, pale bluish or yellowish when seen obliquely. Pleura bicoloured, dark brown above, rapidly changing to slightly reddish yellow below. Coxae and femora yellowish. All pleurotergal hairs, and hairs on upper edge of mesopleuron, pale yellowish. Haltere knob yellowish-brown, stem reddish-yellow.

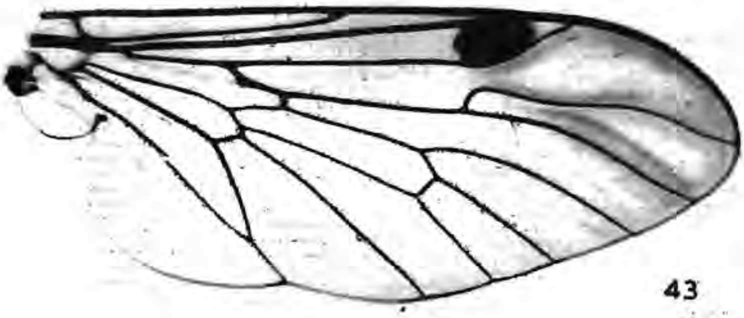


Fig. 43: Wing of *Chrysopilus vespertinus* n.sp. ♂.

Abdomen extensively brownish, first two tergites yellowish-brown, tergites 3-6 darker yellowish-brown on posterior and lateral margins, elsewhere brown; tergite 7 darker, almost chocolate-brown; paler hind parts of tergites with thin greyish pruinescence when seen obliquely. Lateral borders of tergites narrowly darkened, forming a continuous dark streak along side of abdomen, this continuing into darkened lower corner of first tergite and dark upper pleura. First four sternites yellowish-brown, succeeding ones progressively darker brown. Erect hairs on tergites dark and bristly on sides, shorter and paler medially. Recumbent hairs exceedingly scanty, pale reddish-brown on median and anterior parts, whitish to pale yellowish on posterior part. Second and third sternites with pale hairs medially, darker ones laterally, succeeding sternites with dark hairs.

Wing (fig. 43) membrane greyish-hyaline, a slight infuscation at tip, bordering mainly costa and R_4 and R_5, there being a large clear area in both submarginal cells. Stigma brown, suboval, strong, its inner margin somewhat irregular, not filling apex of cell. R_{2+3}

arched beneath stigma, slightly sinuous apically, ending on costa about twice length of *r-m* from R_1. Both R_4 and R_5 sinuous. Apical section of M_3 much shorter than preapical part, index 1·70, discal cell relatively elongate and narrow. Vein issuing from apex of anal cell long, nearly half of apical section of M_3 (ratio 1·95).

Body length, 8·1 mm.

Wing size, 5·8 x 2·6 mm.

♀ Unknown.

Holotype ♂, Analavelona Range, Tulear District, south-western Madagascar, 1320 m.

Notes: This is the only species of *Chrysopilus* so far found in the western biotic province of Madagascar.

Chrysopilus mutabilis n.sp.

The material available is not really adequate for a satisfactory definition of the species to which the large specimens with strongly sinuous R_4 belong, and this is especially apparent in the case of the material brought together here. The variation in antennal and pleural colouration is considered for the present to be intraspecific and subsidiary to venational characters and the darkened tergal margins. A similar case of variation in pleural colouration seems to occur in both subspecies of *madecassus* (p.134).

Size large. Vein R_4 strongly sinuous, R_{2+3} distinctly bowed beneath stigma, lateral borders of at least second and third abdominal tergites narrowly darkened, antennae yellowish-brown or reddish yellow-brown, apical segment sometimes darker. Pleura reddish yellow-brown, or brownish as in *indris*, but not bicolorous due to the upper pleura being much darker than lower. Differing from other large specis with unicolorous pleura and R_4 strongly sinuous in the combination of antennal colour, darkened tergal sides and bowed substigmal section of R_{2+3}. All specimens are rubbed and somewhat discoloured.

♂. Holoptic. Head index 1·17 (Holotype). Facets in slightly more than lower third of eye conspicuously smaller than facets in upper portion, smaller facets sharply separated by a transverse line. Lower frons brownish-grey pruinose on sides, central part occupied by a dark brown, subtriangular area. Antennae yellowish-brown or reddish yellow-brown, third segment slightly darker or distinctly darker brown, except in Marojejy specimen in which they are unicolorous reddish yellow-brown. A dark transverse mark present beneath antennae, extending irregularly onto uppermost portion of face; face elsewhere, and palps, pale yellowish, latter with some stiff, pale hairs; mouthparts slightly reddish-yellow. Parafacials deeply sunken, whitish-grey pruinose. Lower occiput with shining, pale whitish and straw-coloured hairs. Occiput grey, narrowly darkened above along orbits. Ocelli in equilateral triangle. Post-ocular fringe attaining vertex.

Mesonotum and scutellum fairly dark brown, former more yellow-brown laterally. Erect mesonotal hairs dark brown; recumbent hairs small, scale-like, pale golden-yellow, sometimes with slight reddish tinge. Pleura reddish yellow-brown in all specimens except one from Périnet in which pleura are irregularly darkish-brown. Mesopleural hairs pale yellowish; all pleurotergal hairs pale yellowish, or posterior tuft with slightly darker, more brown and stronger hairs than other tufts (Mandraka specimen); all coxal hairs pale yellowish-brown. Coxae and femora reddish yellow-brown, paler than pleura.

Abdominal venter luteous, apical sternites darker than others. First tergite more or less uniformly yellowish-brown; succeeding tergites strongly coloured, second and third with lateral borders conspicuously darkened, an irregular, dark brown area centrally, grading to dark yellow-brown within the dark side margins, hind margins contrastingly bordered with yellow-brown; tergites 4-5 blackish-brown except for reddish yellow-brown hind margins, and slight paling sublaterally which reveals lateral margins to be darkly bordered as are the basal segments; tergites 6 and 7 extensively blackish, only very narrowly dark reddish yellow-brown posteriorly. Erect tergal hairs dark brown; recumbent hairs (Périnet specimen) abundant, dark brown except on pale hindmargins where there are some shining, yellowish hairs, these not extending to sides of tergites. Pleural membrane yellowish-brown.

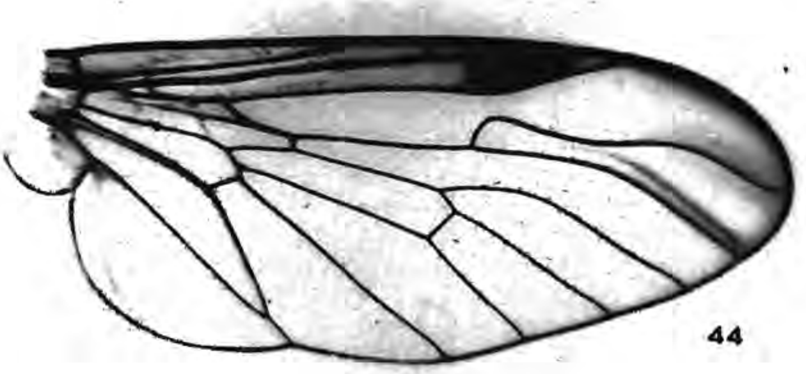


Fig. 44: Wing of *Chrysopilus mutabilis* n.sp. ♂.

Wing (fig. 44) membrane yellowish-hyaline, apex and sometimes outer ends of first four posterior cells slightly browned, subcostal, marginal and (to a lesser extent) costal cells distinctly yellowed. Stigma strong, brown, suboval or with inner end irregular, not filling apex of cell; R_{2+3} distinctly arched beneath stigma, ending on costa far from R_1 (about twice length of *r-m*). R_4 very strongly sinuous, R_5 sharply arched. Discal cell relatively long, M_3 index 1·38—1·67 (mean for all specimens 1·49).
Body length, 9·6 mm. (holotype).
Wing size, 7·7 x 3·5 mm. (holotype).
♀ Unknown.

Holotype ♂, Col Central, Marojejy, R.N.XII, Sambava District, January 1960 (P. Soga); 1 ♂ paratype, La Madraka, February 1944 (A. Seyrig); 1 ♂ paratype, Marojejy Ouest, R.N.XII, Sambava District, September-October 1959, 1300 m. (P. Soga).

The following specimen has darkened pleura and is not made a paratype on account of this: ♂, Périnet, Tamatave District, 8 October 1958 (F. Keiser).

Chrysopilus atricornis n.sp.

There is a series of large specimens with uniformly dark antennae and R_4 strongly sinuous, obviously related to *nemoris* and *mutabilis* but easily distinguished by the antennal colouring. The series divides into two allopatric groups: one from the Marojejy Massif, in which all the pleurotergal hairs are pale and R_{2+3} ends on the costa far from R_1; and the other from lowland forest close to Antongil Bay, with at least the posterior pleurotergal tuft dark and bristly, and R_{2+3} ending closer to R_1. There appear to be some differences in colouration as well, but these cannot be ascertained with certainty because the specimens are greasy and in poor condition. I propose to consider these groups as representing different species, named *atricornis* and *antongilensis* respectively, because the features of the wings and pleurotergal hairs seem to be reliable for diagnostic purposes in the Madagascar *Chrysopilus* fauna. A study of properly preserved material from both localities and the intervening area is required before a final assessment can be made as to the status of the populations described here.

The species described below is large, has entirely dark antennae, yellow face, mouthparts and palps, R_4 strongly sinuous and the pleura reddish yellow-brown. It is closely allied to *antongilensis* but differs in having the pleurotergal hairs pale amber, and R_{2+3} less strongly bowed beneath the stigma and ending on the costa further from R_1.

♂. Holoptic. Head index 1·28. Lower third of eye with facets a little smaller than those in upper part. Lower frons brownish-grey pruinose on the sides, median groove broad and dark. Antennae dark brown below. Upper part of face narrowly darkened, remainder dull yellowish; palps and mouthparts pale yellowish, former with a few stiff, brownish, hairs. Hairs on lower occiput pale straw-colour. Occiput grey, narrowly dark brown above along orbits. Post-ocular fringe attaining vertex. Ocelli in triangle with sides about $1\frac{1}{3}$ times length of face.

Mesonotum brownish. Recumbent hairs shining, pale bluish-white and yellowish-white. Pleura reddish yellow-brown, coxae and femora similar though paler and a little more yellowish, probably somewhat discoloured. All pleurotergal and coxal hairs pale amber.

Abdomen greasy in available specimens, very dark on the tergites, possibly coloured as in *mutabilis*.

Wing (fig. 45) greyish-yellow hyaline, more strongly yellow in subcostal and marginal cells, tip faintly fumose. Stigma brown, quite deep, not nearly filling apex of cell where there is an elongate clear area. R_{2+3} distinctly bowed beneath stigma, its poststigmal part almost straightening out again and slightly undulant, ending on costa far from apex of R_1 (at least twice length of *r-m*). R_4 strongly sinuous, first submarginal cell distinctly narrowed before its middle. R_5 strongly arched. Discal cell elongate, M_3 index 1·34—1·64, mean 1·48.

Body length, 8·5 mm.

Wing size, 7·0 x 3·3 mm.

♀. Only one greasy, teneral specimen is available. Head index 1·04. Frons very slightly diverging upwards, narrow, index 4·34. M_3 index 1·40.

Wing size, 5·9 x 2·8 mm.

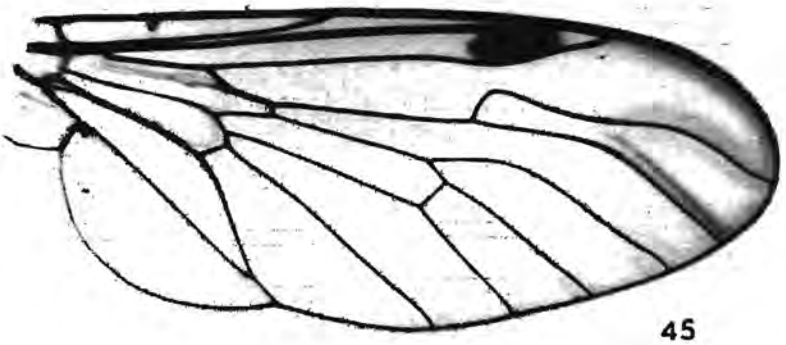


Fig. 45: Wing of *Chrysopilus atricornis* n.sp. ♂.

Holotype ♂, 1 ♂ paratype, Marojejy Ouest, 1300 m., Sambava District, north-east Madagascar, September-October 1959; 1 ♂ paratype without abdomen, Col Central, 1100 m., Marojejy, January 1960; 1 ♀ paratype, same data as holotype, except 1600 m. and November 1959 (all coll. P. Soga).

Chrysopilus antongilensis n.sp.

The status of the specimens described here is discussed under *atricornis*.

Very similar to *atricornis*, distinguished by the dark, bristly posterior pleurotergal tuft, the much stronger bend of R_{2+3} beneath the stigma, and the smaller gap between the ends of R_{2+3} and R_1.

♂. Head as in *atricornis*. Index 1·33.

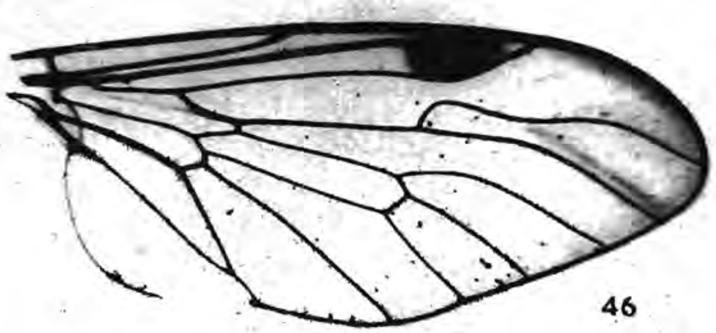


Fig. 46: Wing of *Chrysopilus antongilensis* n.sp. ♂.

Mesonotum in places, and scutellum entirely, covered with brown pruinescence. Recumbent hairs shining whitish and yellowish-white. Pleura irregularly darkish-brown; hairs in posterior pleurotergal tuft dark and bristly, other tufts softer and pale yellowish. Coxae and femora reddish yellow-brown, somewhat discoloured.

Abdomen blackish dark brown, no trace of pale hind margins though these may be obscured by grease.

Wing (fig. 46) as in *atricornis* except that stigma is deeper as a result of a strong arching of R_{2+3}; stigma also more nearly filling apex of cell. R_{2+3} curving forward more strongly than in *atricornis*, ending on costa at a distance from R_1 less than twice *r-m*. M_3 index 1·66. Wing size, 5·4 x 2·6 mm.

♀. Head index 1·17. Frons narrow, slightly biconcave, index 4·50, dark sepia-brown with overlying reddish sheen, a transverse, silvery-grey band from eye to eye at lower end. A dark transverse mark present beneath antennae, extending narrowly into upper face; mouthparts and remainder of face reddish yellow-brown. Ocelli in triangle with sides about $1\frac{1}{3}$ times length of base.

Mesonotum brown with indefinite admixture of yellow. Recumbent hairs shining, pale, frosty blue. Pleura reddish yellow-brown. Posterior pleurotergal tuft dark and bristly; middle tuft weak and pale, hairs of anterior tuft missing (some of the pores large as if the hairs had been bristly). Coxal hairs brown to dark brown, fairly stiff, some bristly.

Abdomen greasy, blackish brown above, first tergite with some shining pale bluish and yellowish recumbent hairs.

Wing as in ♂, except that *r-m* is rather short, so that the distance between ends of R_1 and R_{2+3} is about twice *r-m* length though relatively still less than in *atricornis*. M_3 index 1·38.

Wing size, 5·9 x 2·9 mm.

Holotype ♂, ♀ paratype, Ambohitsitondroina, Maroantsetra district, north-east Madagascar, November 1949 (J. Vadon).

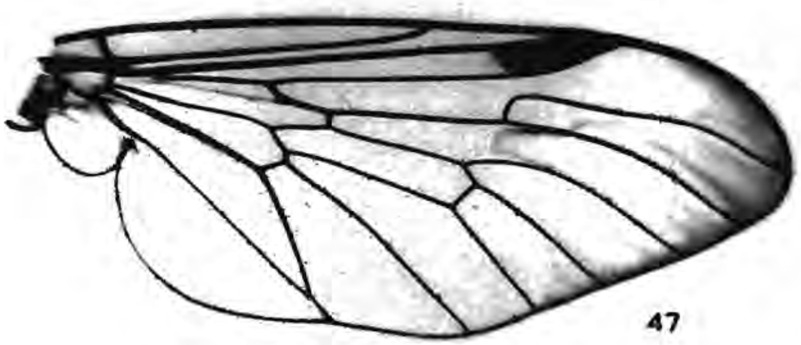
Notes: There is a headless, denuded female labelled with the same data. The wing characters are as in *antongilensis* but the thorax is relatively more robust. This may be only a somewhat larger specimen; wing size, 6·0 x 2·9 mm., M_3 index 1·56.

Chrysopilus indris n.sp.

Size large. Palps slightly reddish-yellow, femora yellowish-brown. Pleura irregularly darkened, but not bicolorous due to the upper pleura being much darker than lower. Lateral borders of abdominal tergites narrowly darkened. Antennae dark brown. R_4 slightly sinuous in apical half, no strong flexure in its basal half which is parallel to R_5. Stigma elongate, practically filling apex of cell, R_{2+3} not bowed beneath stigma. Apparently related to species of *mutabilis* group which it resembles in general colouration and size; *indris* is most conspicuously different in the shape of R_4, the stigma and substigmal part of R_{2+3}; *atricornis* also has dark antennae but the wing differs in the characters cited above. The dark pleura resemble the condition found in the form of *madecassus* and of *mutabilis* having the lower pleura not yellowed. The only available specimen has become greasy on the frons, parafacials, mesonotum and upper parts of the upper pleura, so the description given below is incomplete.

♂. Holoptic, head index 1·17. Lower third of eye demarcated by impressed line, facets in lower part about ⅔ size of facets above. Antennae dark brown. Face yellowish-brown, darker above, possibly somewhat discoloured. Palps and mouthparts slightly reddish yellow, former with darkened tips and stiff, light brownish hairs. Lower occiput with pale yellowish and pale brownish hairs. Ocellar tubercle blackish, ocelli large, about equidistant and fairly close together. Occiput dark olive-grey (probably discoloured), narrowly blackish-brown above along orbits. Post-ocular fringe attaining vertex.

Mesonotum mostly blackish-brown due to grease, sepia-brown areas on lateral parts and scutellum evidently representing original colour. Vestiture mostly missing, some recumbent hairs on lateral parts are small, not scale-like, and reddish-brown. Pleura irregularly darkish brown, thinly greyish-pruinose, coxae slightly more yellowish being drab yellowish-brown, similarly pruinose. Femora yellowish-brown, posterior pair darker than others. Mesopleural hairs mostly pale yellowish, posterior ones darker. Hairs in posterior pleurotergal tuft long, dark brown, bristly, middle and anterior tufts soft, pale yellowish-brown; anterior coxae with dark hairs below, pale ones above; middle and hind coxae with dark hairs. Lower part of sternopleuron with fine, pale hairs.



47

Fig. 47: Wing of *Chrysopilus indris* n.sp. ♂.

First six abdominal sternites luteous, remainder darker brown. Tergites narrowly bordered with black laterally, pleural membrane also darkened; tergites otherwise largely dark brown, each one successively darker, except for an irregular, posterior, sublateral area which is yellowish-brown, the hind tergal margins also obscurely and narrowly yellow-tinged. Erect hairs on sternites shorter, finer and paler than those on tergites which are long, stiff and dark; recumbent hairs on the tergites are fine and dark except for some shining, pale yellowish ones on posterior part of tergites 2-6.

Wing (fig. 47) membrane slightly smoky, tip narrowly darkened by microtrichia which extend also in a narrow band along outer edge in first three posterior cells. Stigma dark brown, elongate, very nearly filling apex of cell, its inner end with curved edge. R_{2+3} not arched beneath stigma, but bending gradually forward so that marginal cell is evenly narrowed over stigma, ending on costa at about length of *r-m* from R_1. R_4 slightly sinuous on apical half, basal part subparallel to R_5 which is gently arched. M_3 index 1·28. Body length, 9·2 mm.

Wing size, 7·3 x 3·4 mm.

Holotype ♂, Périnet, Tamatave District, east-central Madagascar, 27 September 1958 (F. Keiser).

Notes: The specific name refers to the large lemur *Indri indri* (Gmelin), whose ringing calls can often be heard in the early morning in the forest at the type locality.

Chrysopilus nemoris n.sp.

Size large. Vein R_4 gently sinuous, R_{2+3} not strongly arched beneath stigma. Pleura pale yellowish. Stigma shaped as shown in fig. 48. Antennae pale yellowish. Lateral borders of abdominal tergites not darkened. Resembling *atricornis* and *mutabilis*, differing from them mainly in the shape of R_4 and apical section of R_{2+3}, in these characters somewhat resembling *indris* but differing from that species in the shape of the stigma and colour of pleura and coxae. In the shape of the stigma and apical section of R_{2+3}, yellowish antennae and pale abdominal pleura, this species is intermediate to *zanjensis* and the members of the *keiseri* group.

♂. Holoptic. Head relatively broad, index 1·27—1·36. A transverse line across eye demarcates lower third in which facets are very slightly smaller than those above line. Upper and lower sections of frons whitish-grey pruinose, lower section with dark median mark which is expanded at lower end. Antennae uniformly pale yellowish, a dark transverse mark present below, extending narrowly onto upper part of face; remainder of face, palps and mouthparts, pale yellowish. Parafacials strongly withdrawn, whitish-grey pruinose. Palpal hairs short, sparse, stiff, brownish. Lower occiput with shining whitish and pale yellowish hairs. Occiput dull grey narrowly bordered along upper edge on each side of vertex by dark brown. Post-ocular fringe attaining vertex. Ocellar tubercle dark brown with overlying, shifting, brownish-grey pruinescence; ocelli in equilateral triangle.

Mesonotum and scutellum brown, former with yellowish-brown dorsocentral lines; humeri and notopleuron yellowish-brown. Erect mesonotal hairs brown, much longer on prescutellar area than on anterior mesonotum; erect hairs on posterior notopleuron and in a pre-alar group are stiff and blackish with reddish-brown reflections, long hairs on anterior part of notopleuron pale yellowish. Recumbent hairs shining, pale whitish-blue in postero-dorsal view, dark in posterior view, some with reddish tints in dorso-lateral view. Pleura pale yellowish, indefinitely tinged with brown; upper edge of mesopleuron dark brown with row of pale yellowish hairs. All pleurotergal hairs pale yellowish. Coxae with pale yellowish hairs above, dark brown ones on lower part. Haltere knob fuscous, stem pale yellowish. Fore and middle coxae and femora pale yellowish, hind coxae and femora more brownish yellow.

Abdominal venter pale yellowish to luteous, apical sternites always darker than the others; tergites brown except for contrasting yellowish, quite broad, postero-lateral triangles which connect across midline by a narrow, yellowish band on hind margin, the brown becoming progressively darker towards apex of abdomen. Erect and sub-erect tergal hairs dark brown; recumbent hairs small, mostly obscure reddish, yellow hind margins with some very fine, shining, whitish recumbent hairs.

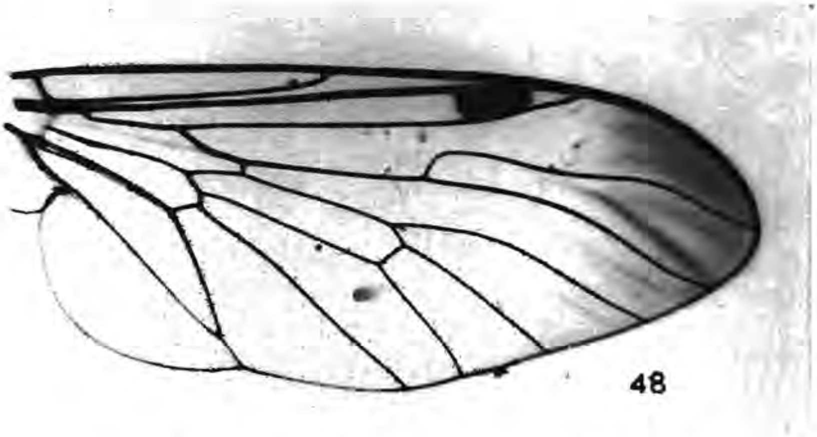


Fig. 48: Wing of *Chrysopilus nemoris* n.sp. ♂.

Wing membrane greyish hyaline, apex distinctly darkened, subcostal and marginal cells slightly yellowish pruinose. Stigma brown, irregularly elongate, quite a large, clear area in apex of cell, R_{2+3} only very gently bent beneath stigma, ending on costa at a distance from R_1 about equal to 1½ times *r-m*. R_4 distinctly sinuous, R_5 slightly undulant. Discal cell moderately elongate, M_3 index 1·46—1·70, mean 1·57.

Wing size, 5·9 x 2·6—6·5 x 3·0 mm.

♀ Unknown.

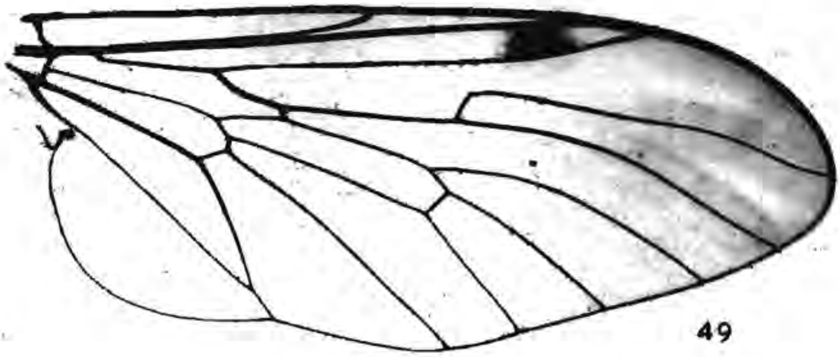
Holotype ♂, Andasy II, Marojejy Massif, Sambava District, north-east Madagascar, 1300 m., December 1958 (Raharizonina); 1 ♂ paratype, Mandritsara, February 1950 (J. Vadon); 1 ♂ paratype, Ambohitsitondroina, Maroantsetra District, north-eastern Madagascar, November 1949 (J. Vadon).

Notes: Apparently a species of the lower and middle montane rain forest in the north-eastern parts of the island.

Chrysopilus zanjensis n.sp.

A medium-sized species with a large head, distinguished by yellowish antennae, face, palps and mouthparts, pale yellow-brown pleura, shining, bluish recumbent hairs on mesonotum and scutellum, reduced stigma, R_{2+3} running almost straight to costa, deep fork of R_4 and R_5, these two veins arched and only moderately diverging, and by hairs in posterior pleurotergal tuft being long, bristly, dark brown, the other tufts with much weaker, pale amber hairs. This species shows affinities with the *keiseri* group in the shape of the stigma and apical part of R_{2+3}. In these features and in appearance and colouration *zanjensis* seems also to be allied to *nemoris*.

♂. Head relatively broad, distinctly broader than the thorax, index 1·33. Holoptic. Lower third of eye with facets slightly smaller than those in upper part. Lower frons whitish-grey pruinose. Antennae yellowish, second and third segments slightly brown-tinged. A darkish mark below antennae, extending onto parafacials and narrowly and indefinitely onto uppermost part of face; face elsewhere yellowish; palps cylindrical, about height of face, yellowish with a few long, stiff, pale hairs; mouthparts yellowish with slight reddish tinge. Face in lateral profile strongly and sharply depressed in uppermost part. Parafacials retreating very strongly inwards, in front view showing an oblique ridge on each side, these ridges meeting beneath antennae. Hairs on lower occiput shining whitish and pale yellowish. Occiput ash-grey, narrowly dark blackish-brown above along eye margins. Post-ocular fringe attaining vertex. Ocellar tubercle not very prominent in lateral view, darkish-brown, ocelli in triangle with sides slightly larger than base.



49

Fig. 49: Wing of *Chrysopilus zanjensis* n.sp. ♂.

Mesonotum teak brown, with narrow, pale dorsocentral stripes. Erect hairs sparse and short over most of mesonotum, but more numerous and quite long on posterior part, scutellum with many long marginal hairs; all erect hairs dark, slightly reddish-brown. Mesonotum and scutellum densely covered with scale-like recumbent hairs, these appearing bright, frostly pale blue in postero-dorsal view, changing to reddish and dark-reddish brown in dorsal view. Long hairs on anterior part of notopleuron pale yellowish, those on posterior part dark brown with reddish reflections. Pleura clear, light yellowish-brown, coxae similar but more yellow, fore and middle femora yellowish, hind femora yellowish-brown. Haltere knob fuscous, stem yellow-brown.

Abdominal sternites luteous, tergites reddish-brown laterally, narrowly yellowish-brown on hind margins, remainder medium chocolate-brown. Erect hairs dark, bristly. First tergite with only a few recumbent hairs, these shining, pale whitish-blue; recumbent hairs on remaining tergites very small and mostly dark reddish-brown, some shining whitish and whitish yellow ones on hind parts, especially on marginal yellowish-brown bands.

Wing (fig. 49) somewhat elongate, greyish hyaline with faint infumescence at tip. Stigma smoky-brown, short, space in apex of cell about as long as stigma itself. R_{2+3}

only slightly curved beneath stigma, ending about twice length of *r-m* from R_1, marginal cell of very even width throughout. Fork of R_4 and R_5 deep, R_4 slightly undulant in apical half, arched overall, R_5 arched as shown in figure. M_3 index 1·38.

Body length, 6·8 mm.

Wing size, 5·6 x 2·3 mm.

♀ Unknown.

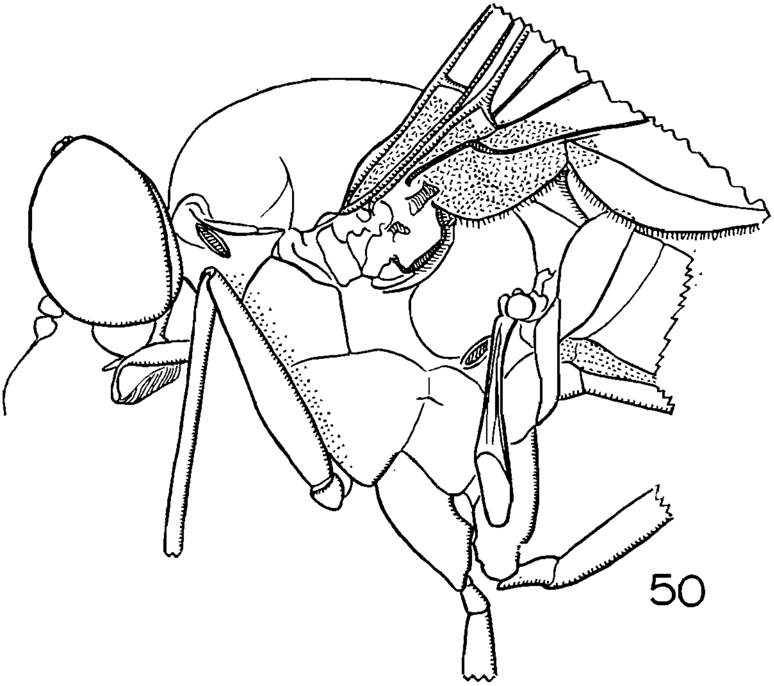
Holotype ♂, Roussettes Forest Station, Montagne d'Ambre, Diego-Suarez District, northern Madagascar, 1000 m., 23.XI.-4.XII.1958 (B. R. Stuckenberg).

Notes: The specific name is based on an old Arab name for the part of the Indian Ocean that washes the shores of Madagascar and the Mascarene Islands.

Chrysopilus latipennis n.sp.

This species and the following two constitute a group distinguished by the characters given in the first part of section 14 of the key. The three species are diagnosed at section 15. To the naked eye they are of medium size with a body colouration predominantly brownish and yellowish-brown with a slight reddish tinge.

A small-headed, long-legged species with relatively large wings, reddish-brown thorax and darkened abdomen, without shining blue mesonotal and scutellar hairs, with bicolorous antennae, all pleurotergal hairs brown and bristly, male dichoptic, and female frons parallel-sided. Related to the *keiseri-moramangensis* species pair from which it can be distinguished as detailed in the key.



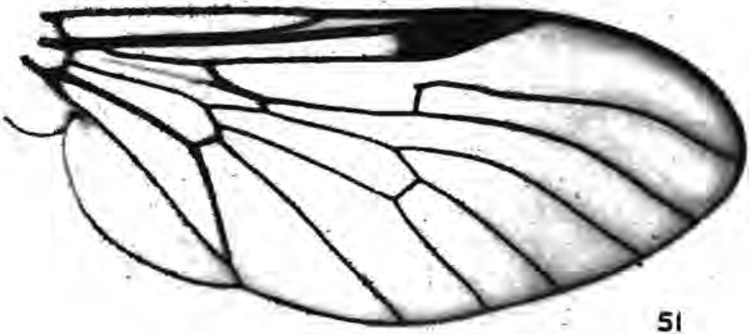
50

Fig. 50: *Chrysopilus latipennis* n.sp., ♂ in lateral view to show relative size of head.

♂. Head unusually small in relation to body (fig. 50), hardly wider than thorax, index 1·02. Dichoptic, frons continuous, eyes at closest separated by about vertical diameter of anterior ocellus. Each eye with a faint, impressed, horizontal line just below middle, facets in lower part very slightly smaller than those in upper. Frons dark velvety-brown with overlying greyish sheen. Antennae bicolorous, first and second segments yellowish-brown, third segment dark brown. A dark, transverse mark below antennae, extending onto upper face; face otherwise yellowish, palps and mouthparts reddish-yellow with short, yellowish-brown hairs. Parafacials strongly retreating, whitish-grey pruinose. Ocellar tubercle not conspicuous in lateral view, blackish-brown, ocelli in triangle with sides larger than base. Occiput uniformly dark-grey. Hairs on lower occiput shining pale yellowish and yellowish-brown. Post-ocular fringe attaining vertex, hairs quite strong.

Mesonotum reddish-brown with yellow tinge; erect hairs mostly short, sparse and dark, longer and stronger on posterior part; recumbent hairs small, sparse, blackish, some appearing reddish in certain positions; long hairs on notopleuron stiff, black. Pleura clear yellowish-brown. Mesopleural hairs black, or dark brown with reddish shine. All pleurotergal hairs dark brown, bristly. Coxal hairs brown to dark brown, those on upper part of anterior coxa are finer and more reddish-brown. Legs unusually long. Coxae and femora yellowish-brown like pleura. Tibiae and tarsi brown, spurs reddish-brown. Haltere rather long, attaining mid-point of hind coxae when hanging down, knob fuscous, stem dull yellowish-brown.

Abdominal sternites mostly luteous, apical ones more brown; tergites shining brownish, an admixture of yellow apparent on first four tergites, at least on hind margins, tergites 5-7 progressively darker brown. Hairs on tergites mostly blackish, a few fine, shining, pale hairs among the recumbent ones.



51

Fig. 51: Wing of *Chrysopilus latipennis* n.sp. ♀.

Wing (fig. 51) relatively large and broad, veins strong. Membrane greyish-hyaline, tip of wing slightly darkened; sub-costal cell and marginal cell around stigma slightly yellowed. Stigma brown, quite sharply defined, elongate, irregularly truncated at inner

end, not filling apex of cell. R_{2+3} gently curved beneath stigma, its extreme apex flexed basad, ending a little more than length of *r-m* from R_1. Both R_4 and R_5 moderately undulant, gradually diverging. Discal cell elongate, narrow; M_3 index 1·30.
Body length, 7·1 mm.
Wing size, 6·3 x 3·0 mm.

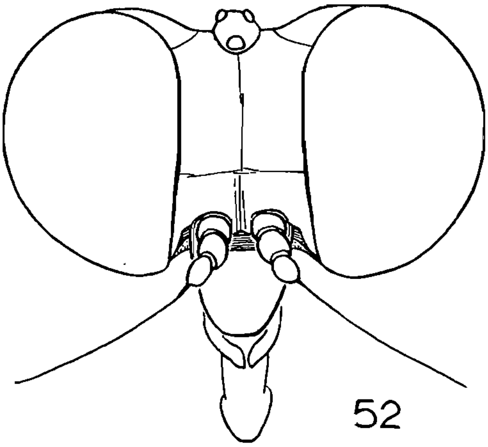


Fig. 52: *Chrysopilus latipennis* n.sp., ♀ head in frontal (slightly dorsal) view.

♀. Head relatively small as in ♂, index 1·04. Frons (fig. 52) parallel-sided, narrow, index 3·83, dark reddish grey-brown, a transverse whitish-grey band present above the antennae. Ocellar tubercle only a little darker than surrounding area; ocelli in triangle with sides larger than base. M_3 index 1·26. Otherwise colouration and vestiture as in ♂.
Wing size, 6·7 x 3·1 mm.
Holotype ♂, paratype ♀, Anjavidilava, Andringitra Range, Ambalavao District, central Madagascar, 17-21 January 1958, 2020 m. (B. R. Stuckenberg).
Notes: This locality is at the eastern end of the Andringitra Range, on an escarpment at the upper limit of the forest. The specimens were collected from tall herbage in the forest.

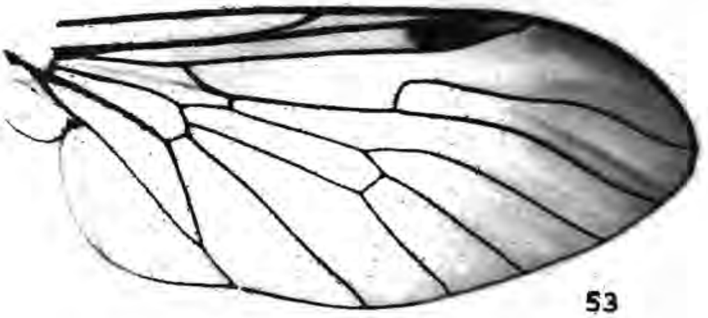
Chrysopilus keiseri n.sp.

With the group characters as given in section 14 of the key; a predominantly reddish-brown medium-large species with very bright blue recumbent hairs on mesonotum and scutellum (these hairs appearing black when viewed end-on), dark brownish antennae, pale amber coxal and pleurotergal hairs, male dichoptic, female frons slightly convergent upwards, and ocellar tubercle darkened. Most closely related to *moramangensis*, distinguishing features described in the key.

♂. Head index 1·18. Dichoptic, eyes not quite touching, frons at narrowest slightly less than transverse diameter of anterior ocellus. Frons blackish-brown, lower part with thin, shifting greyish sheen. Part of eye with reduced facets relatively large, more than a third of eye area, facets in lower part not very much reduced, more than half as large as facets in upper section. Antennae dark brown. A very dark brown area below antennae, extending on to upper part of face; palps, mouthparts and remainder of face contrasting slightly reddish yellow. Parafacials sunken, blackish-brown with shifting whitish-grey sheen. Ocellar tubercle moderately prominent, blackish, ocelli in triangle with sides slightly longer than base. Hairs on lower occiput and mouthparts shining pale yellowish-brown; palpal hairs light brownish, stiff. Occiput uniformly dark grey, possibly discoloured; postocular fringe attaining vertex.

Mesonotum and scutellum brown with yellowish tinge, pleura paler, clear yellowish-brown. Erect mesonotal hairs dark, rather short, the long ones on lateral parts reddish in dorsal view, blackish when seen obliquely. Recumbent hairs of mesonotum and scutellum scale-like, very bright electric-blue in some positions, black in others (especially when seen end-on). Mesothoracic spiracle with dark lips. Coxal and all pleurotergal hairs pale amber, some coxal hairs reddish. Coxae and femora clear yellowish-brown, femora and tibiae brown; tibial spurs reddish with dark tip. Haltere knob fuscous, stem pale yellowish.

Abdomen mainly yellowish-brown, tergites (except for their lateral margins) progressively more darkly brown towards apex of abdomen, sternites yellowish-brown except the seventh which is darker. All hairs on tergites blackish or dark brown, recumbent hairs numerous, quite long, not scale-like. Sternites with longer, dark hairs on posterior margins, shorter pale ones elsewhere.



53

Fig. 53: Wing of *Chrysopilus keiseri* n.sp. ♂.

Wing (fig. 53) smoky greyish-hyaline, apex fumose in an area extending to ends of R_{2+3} and M_4, subcostal and marginal cells distinctly yellowed; faint clear streaks in submarginal and posterior cells. R_{2+3} only slightly arched beneath stigma, ending on costa at a point a little more than length of *r-m* distant from R_1. Stigma brownish, elongate, irregular, not filling apex of cell by a considerable area. R_4 sinuous, R_5 slightly sinuous. Discal cell relatively long and narrow, M_3 index 1·59.
Body length, 8·1 mm.
Wing size, 6·0 x 2·6 mm.

♀. Head index 1·10. Frons narrow, index 5·1, slightly convergent upwards, reddish-brown admixed with grey except above antennae where a whitish-grey band extends from eye to eye. Ocellar tubercle very dark brown, conspicuously darker than vertex and frons; ocelli in triangle with sides slightly longer than base. Parafacials quite densely shifting whitish-grey pruinose, contrasting strongly with dark area beneath antennae. Vertex somewhat sunken, ocellar tubercle only narrowly visible in lateral view; post-ocular fringe attaining vertex.

Abdomen reddish-brown admixed with yellow, with irregular brownish marks above, retracted segments dark brown. First tergite with very pale bluish-white, shining recumbent hairs, other tergites with recumbent hairs shorter than in ♂, mostly blackish but some pale and shining.

Wing as in ♂ except apex only very faintly fumose, and R_4 not as strongly sinuous. M_3 index 1·16, very different.

Wing size, 5·8 x 2·7 mm.

Holotype ♂, Périnet, Tamatave District, east-central Madagascar, 7 October 1958 (F. Keiser); paratype ♀, same locality, December 1955 (B. R. Stuckenberg).

Notes: The paratype was observed on low herbage on the bank of a stream in small, steep-sided, forested valley. A beautiful species, named in honour of Dr. F. Keiser.

Chrysopilus moramangensis n.sp.

This species, represented by two females, is very closely related to *keiseri* with which it is sympatric. Like *keiseri* a predominantly yellowish-brown species, the mesonotum and abdominal tergites brownish; a dark area beneath the antennae that contrasts strongly with yellow antennae, face, palps and mouthparts. Distinguished by the combination of yellowish antennae, dark, stiff hairs in posterior pleurotergal tuft, ocellar tubercle conspicuously darker than surrounding area, and coxal hairs mostly dark.

♀. Head index 1·12—1·19. Frons narrow, index 4·55—4·65, biconcave or diverging upwards slightly, coppery-brown, a transverse, whitish-grey band above antennae; ocellar tubercle blackish, much darker than surrounding parts, ocelli close together in almost an equilateral triangle. Antennae yellowish. A dark brown area present between face and antennae. Parafacials strongly retreating, shining greyish pruinose. Face yellow, slightly darkened above, palps yellow with a few pale hairs. Mouthparts yellow. Occiput brownish-grey, paler laterally. Hairs on lower occiput yellowish-brown. Post-ocular fringe attaining vertex, hairs on vertex stiff and bristly. Vertex somewhat sunken, ocellar tubercle only narrowly visible in lateral view.

Mesonotum brownish with paler dorsocentral stripes. Erect hairs very short, brownish. Notopleural hairs black, bristly. Recumbent hairs very small, scale-like, brightly shining, pale yellowish-blue to pale bluish. Pleura yellowish-brown; mesothoracic spiracle with dark lips; mesopleural hairs yellowish-brown except for some black ones at posterior end of row. Hairs on fore-coxae mostly pale brown and yellowish-brown, those at lower end dark and stronger; hairs on middle and hind coxae mostly dark brown, some pale hairs on inner surface of middle coxa. Hairs in posterior pleurotergal tuft dark, strong and bristly, in middle tuft soft, fine and yellowish, in anterior tuft brown or yellowish-brown and much weaker than those in posterior tuft. Haltere knob fuscous, stem pale yellowish. Coxae and femora clear yellowish, tibiae and tarsi brownish, spurs reddish with dark tips.

Abdominal sternites yellowish-brown; tergites yellowish-brown laterally and on posterior margins, elsewhere brownish; retracted segment dark greyish-brown, intersegmental membranes dull orange. Hairs on tergites dark brown; some fine, shining, pale bluish and whitish blue recumbent hairs also present, especially numerous on first tergite.

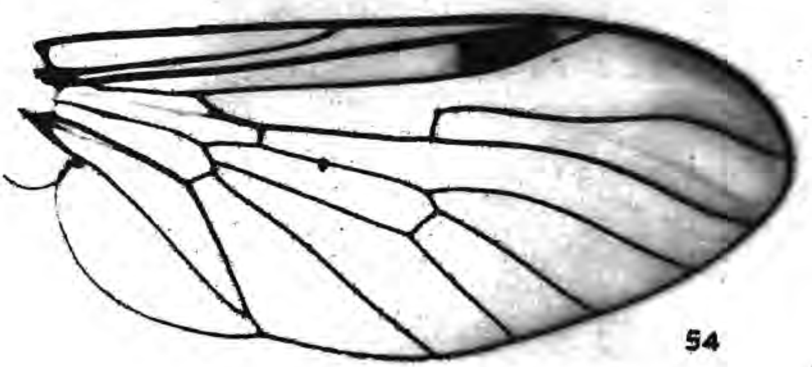


Fig. 54: Wing of *Chrysopilus moramangensis* n.sp. ♀.

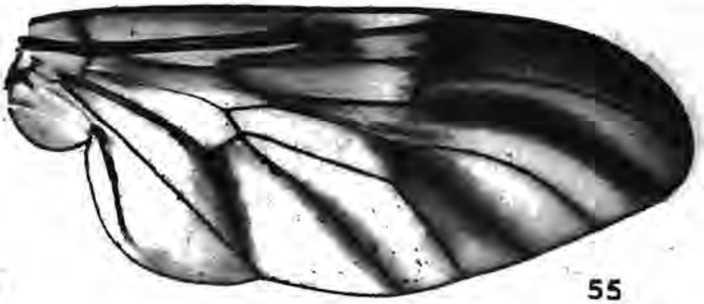
Wing (fig. 54) greyish-hyaline, very faintly fumose at tip. Subcostal and marginal cells slightly yellowed. Stigma darkish brown, elongate, irregularly truncated on inner end, not filling apex of cell. R_{2+3} very gently curved beneath stigma, ending slightly more than length of *r-m* from R_1. R_4 sinuous, R_5 slightly so. M_3 index 1·44 and 1·70.
Wing size, 6·0 x 2·7—6·8 x 3·0 mm.
Holotype ♀, Moramanga, Tamatave District, east-central Madagascar, 9 October 1958 (F. Keiser); Paratype ♀, Périnet, east of Moramanga, 7 October 1958 (F. Keiser).

Chrysopilus ivontakae n.sp.

Size medium; a reddish-brown species with black mesonotal and abdominal hairs, yellowish antennae, conspicuously patterned wing, and small, deeply-sunken face. Related to species of the *keiseri* group.
♂. Holoptic. Lower third of eye with facets about half as large as those above, an impressed line demarcating area of reduced facets. Head of normal proportions, index 1·09—1·16, eyes relatively large, lower occiput only narrowly visible in lateral view. Lower frons with linear median groove in shallow, dark brown furrow, shining greyish-white pruinose above the antennae. Antennae yellowish, third segment slightly darker and much smaller than second. Parafacials retreating inwards strongly, silvery-grey pruinose, a dark brown area between antennae and face. Face relatively small, dorso-ventrally shortened, strongly

inflated so that its depth exceeds height; it is deeply sunk in head and only a very small part is visible in lateral view; face yellowish-brown with brown mark above. Orbits not widely diverging at lower frons, with slight concavities opposite antennae, facial area in general small and set low. Palps clear yellowish-brown, sub-cylindrical, in length almost twice depth of face, bearing stiff, radiating, dark brown hairs. Proboscis luteous, with pale hairs. Upper frons very small, dark greyish pruinose, ocellar tubercle dark brown, ocelli in triangle with sides 1½ times length of base, some stiff, proclinate black hairs on back of tubercle. Occiput dark ash-grey, dark brown above adjacent to vertex and along upper eye margins. Hairs on lower occiput pale yellowish or pale yellowish-brown; post-ocular setulae not attaining vertex.

Mesonotum reddish-brown, scutellum similar but a little paler. All mesonotal and scutellar hairs blackish, only a few small, reddish hairs on upper part of supra-alar declivity, recumbent hairs not scale-like or woolly. Pleura, coxae and femora reddish yellow-brown, femora somewhat more yellowed. A small, dark brown mark on lower, anterior corner of mesopleuron, bordering coxal cavity. Pleurotergal hairs all pale yellowish, or posterior tuft dark brown (holotype). Coxal hairs pale brownish and yellowish. Lips of mesothoracic spiracle dark. Upper corner of mesopleuron with dark hairs, upper anterior edge with pale yellowish-brown hairs. Halteres pale reddish-brown.



55

Fig. 55: Wing of *Chrysopilus ivontakae* n.sp. ♂.

Abdomen yellowish-brown, in places clear reddish-brown due to contents, apical tergites and sternites irregularly darkened. Erect hairs bristly, dark brown to blackish. Recumbent hairs blackish, arranged in basal or sub-basal bands that occupy about a third of width of tergite except on sixth and seventh tergites where bands are broader, a broad apical part of tergite without, or with very few, recumbent hairs. Sternites with dark hairs.

Wing (fig. 55) membrane irridescent, greyish-hyaline with extensive smoky-brown pattern as shown in figure; pattern consisting mainly of extensive infuscation along veins. Costal cell more or less uniformly coloured, subcostal cell similar except for yellowish area near apex, marginal cell smoky-brown except for prestigmal yellowish area beneath similar area in subcostal cell, first submarginal cell largely fumose except for indefinite yellowish area beneath similar area in marginal cell, second submarginal cell fumose except for pale streak, first posterior cell irregularly fumose in basal half and along entire edge of fourth vein, not fumose along M_1 for most of its length, second posterior cell fumose along M_2 and at base, third posterior cell generally fumose except for faint median streak, infuscations also along M_4 and anal vein, around margin of anal lobe, and in apex of discal cell. Stigma brownish, poorly defined, reduced on inner side by an indentation, not quite filling apex of cell. R_{2+3} curving gently underneath stigma, slightly undulant apically, and ending in costa about 1½ times length of *r-m* from R_1. R_4 and R_5 arched, slightly divergent. M_3 index 1·10—1·26, mean 1·20, discal cell moderately large; *m-cu* meeting M_4 on discal cell, or basal section of M_4 extremely short.

Body length, 6·0—7·1 mm.

Wing size, 4·3 x 2·1—4·7 x 2·3 mm.

♀ Unknown.

Holotype ♂, paratype ♂, Ivontaka, Mananara District, eastern Madagascar, 15 m., 10-14.III.58 (B. R. Stuckenberg); 1 ♂ paratype, Antongonivitsira, August 1950 (J. Vadon).

Notes: Ivontaka is a small coastal village backed by forest-covered hills. The two specimens from this locality were swept from shrubbery growing along a path in the forest.

Chrysopilus cognatus n.sp.

Size small. A reddish-brown species with brown antennae, conspicuous dark basal bands on intermediate abdominal tergites, unpatterned wing, indefinite, pale yellowish-brown stigma, black mesonotal hairs, mesothoracic spiracle having pale yellow margins, and ♀ frons widening towards vertex and distinctively coloured. Related to *ivontakae* n.sp.

♂. Holoptic. Head index 1·17. Lower quarter to third of eye with facets only about one-third as large as facets in upper part, upper facets unusually large on anterior and antero-lateral surfaces of eye. Lower frons small, greyish-white pruinose, the median groove dark. Antennae brown. Parafacials retreating inwards, pale greyish pruinose. Face short in vertical axis, inflated, pale yellow-brown with indefinite, brownish median mark. Palps about as long as height of face, dull yellowish with a few stiff, brownish hairs. Mouthparts reddish-yellow. Ocellar tubercle prominent in lateral view, blackish with thin greyish pruinescence, ocelli dark brown, arranged in triangle with sides about 1½ times length of base. Occiput dark grey, somewhat discoloured and blotched, apparently a dark brown mark on each side above, along orbit. Hairs on lower occiput scanty, pale brownish; post-ocular fringe not attaining vertex.

Mesonotum and scutellum reddish-brown, denuded in holotype but probably black haired (with very few erect hairs) as in ♀ described below. Pleura yellowish red-brown, coxae pale yellow-brown, femora yellowish. Anterior thoracic spiracle with pale yellow margins. Anterior and middle pleurotergal hair tufts pale, posterior tuft dark. Mesopleural and coxal hairs shining pale brownish. Haltere dull yellowish.

First abdominal tergite yellowish-brown; second tergite dull yellowish-brown on basal quarter, a brown transverse band over second quarter, apical half brown yellowish; tergites

3-5 dark brown on basal half or a little less, yellowish-brown apically; tergites 6-7 uniformly dark, mahogany brown. Sternites brownish yellow except sixth and seventh which are dark brown like their corresponding tergites. Abdomen mostly denuded, remaining hairs all dark.

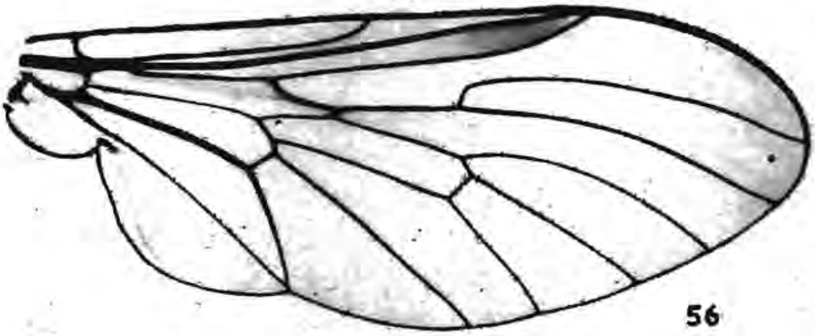


Fig. 56: Wing of *Chrysopilus cognatus* n.sp. ♀.

Wing rather narrow, greyish-hyaline, slightly yellowed in costal and subcostal cells. Stigma diffuse, pale yellowish-brown; R_{2+3} hardly curving beneath stigma, marginal cell almost of equal width throughout, R_{2+3} ending on costa at a distance from R_1 a little greater than length of *r-m*. R_4 angled basally, R_4 and R_5 arched, slightly divergent. M_3 index 1·06, discal cell moderately large, widening apically.

Body length, 5·3 mm.

Wing size, 3·9 x 1·7 mm.

♀. Head index 1·00. Frons (fig. 57) diverging towards vertex, index 3·00, distinctively coloured, being uniformly shining silvery-grey pruinose but appearing dark sepia-brown in oblique view; a weak yellowish-grey mark above each antenna. Vertex somewhat sunken, tubercle therefore not prominent in lateral view; ocelli arranged in equilateral triangle. Setulae in post-ocular fringe quite long, fringe attaining vertex.

Mesonotum reddish-brown, with slightly yellowed dorsocentral lines. All mesonotal and scutellar vestiture black, the erect hairs short and sparse, some recumbent hairs having a reddish shine in half-oblique view. Middle pleurotergal tuft pale, posterior tuft brown, anterior tuft paler brown.

First abdominal tergite dark brownish, narrowly luteous in hind margin; tergites 2-4 dark brown on lateral two-thirds, grading rapidly to luteous on apical part. Retractile segments dull sepia.

Wing (fig. 56) differing in some respects to that of ♂, R_{2+3} curving forwards more strongly at end of stigma and ending close to apex of R_1. Discal cell almost parallel-sided; M_3 index 1·25.

Wing size, 5·2 x 2·2 mm.

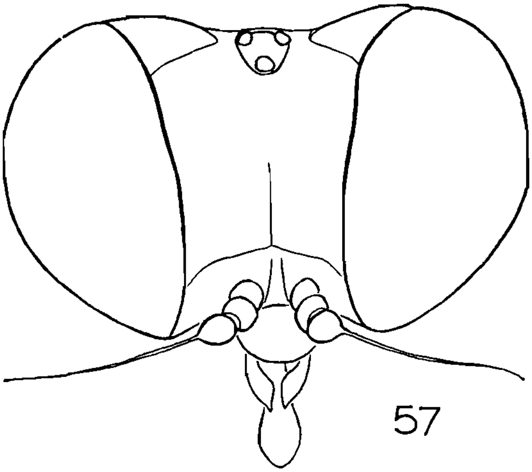
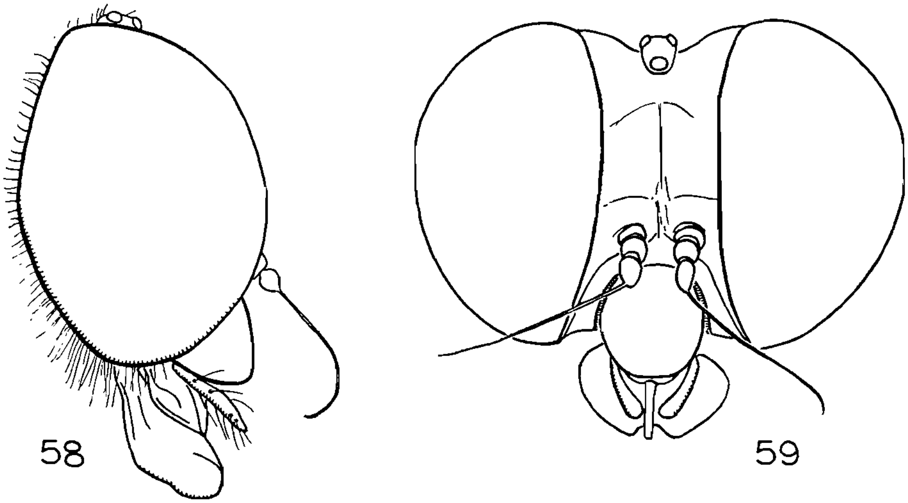


Fig. 57: *Chrysopilus cognatus* n.sp., ♀ head in antero-dorsal view. (There is slight distortion due to foreshortening.)

Holotype ♂, Montagne des Francais, February 1959 (A. Robinson); paratype ♀, Roussettes Forest Station, Montagne d'Ambre, 1000 m., 23-XI.-4.XII.1957 (B. R. Stuckenberg). Both localities in Diego-Suarez District, northern Madagascar.

Chrysopilus vadoni n.sp.

A large, spectacular species with boldly patterned wings. Easily distinguished by the characters given in the key, and without related species in Madagascar. The appearance, structure of the head, and position of the apex of R_1 about midway between *Sc* and the wing-tip, indicate *vadoni* to be related to the Oriental-Australasian *ferruginosus* (Wied).



Figs. 58, 59: *Chrysopilus vadoni* n.sp.; (58) ♂ head in lateral view, (59) ♀ head in anterior view.

♂. Head (fig. 58) relatively small, holoptic, eyes with slightly reduced facets in lower third which is demarcated by a faint transverse line from upper facets. Lower frons with shifting, yellowish-grey pruinescence, median depression dark brown. Antennae pale orange. Face protruding subconically forward, very prominent in lateral view, dull yellowish with a thin, broken, brown median line and rather matt, silvery-yellow pruinescence. Palps subcylindrical, exceeding apex of face, dull orange, hairs sparse and pale brownish. Mouthparts brownish-yellow. In holotype the parafacials deeply sunken and almost touching sides of face, but this appears to be unnatural and partly due to lateral squeezing of head; parafacials shining greyish pruinose, yellowish-grey along eye-margins. Hairs on lower occiput sparse, whitish and pale brownish. Occiput grey, quite broadly blackish-brown above along orbits. Post-ocular fringe attaining vertex. Ocellar tubercle moderately prominent, dark with light brownish pruinescence; ocelli in triangle with sides slightly longer than base. Upper frons elongate triangular, yellowish-grey pruinose, darkening above.

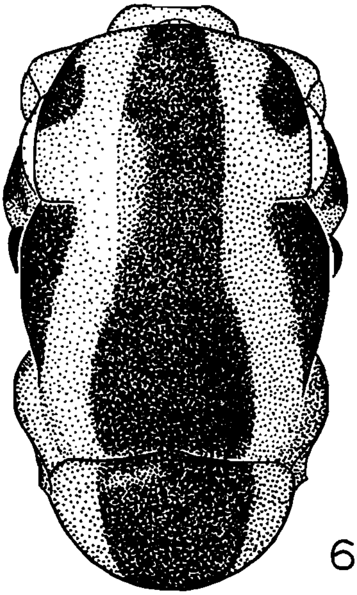


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Fig. 60: *Chrysopilus vadoni* n.sp., ♂ mesonotum.

Mesonotum and sides of scutellum fulvous, patterned as shown in fig. 60, there being a large, brown median vitta which is narrowest anteriorly but widens somewhat before passing between transverse sutures then abruptly widens again midway between upper end of sutures and hind edge of mesonotum, continuing onto scutellum. Humeri and notopleura yellowish-white pruinose. A small, dark brown posthumeral mark present, and a large postscutular one which extends to lateral borders of mesonotum. Erect hairs apparently sparse, short, brownish, some long, dark brown ones in hind corner of notopleuron; recumbent hairs shining, pale golden-yellow. Pleura mainly dark brown, a prominent greyish-white pruinose area extending over pleurotergite and posterior half of sternopleuron, mesopleuron dark brown anterodorsally, elsewhere paler with thin, brownish-grey pruinescence. Mesothoracic spiracle with dark lips. Anterior and posterior coxae dull yellowish, contrasting with dark blackish-brown middle coxae. Fore femora dull yellowish, middle and hind femora brownish. Haltere knob blackish-brown, stem dull brownish-yellow. Hairs in posterior pleurotergal tuft dark brown, strong and bristly, those in middle tuft soft, fine, much shorter, pale yellowish; anterior tuft not clearly formed, instead fine, pale hairs scattered over disc of pleurotergite. Hairs on fore coxae pale and soft, those on middle coxae dark brown and bristly.

Abdomen generally dark brown with yellowish-brown hind margins on tergites except on apical ones. First tergite extensively dull yellowish-brown, narrowly dark brown on shoulders and anterior face. Anterior quarter of second tergite bare and dull yellowish-brown, with postero-lateral triangles of same colour that meet narrowly in mid-line, this tergite elsewhere dark brown. Third, fourth and fifth tergite blackish-brown with dull, slightly reddish yellow-brown postero-lateral triangles that meet narrowly in mid-line. Remaining tergites brownish-black. First and second sternites dull yellow-brown; third sternite irregularly brownish, brownish-yellow on hind margins; fourth and fifth sternite dark brown, very narrowly yellow-tinged on hind margin; remaining tergites brownish-black. Abdominal hairs nearly all dark brownish on dark parts; some small, pale, whitish-yellow hairs on hind margins at sides on tergites 2–5; first tergite with long, pale yellowish hairs appearing to radiate outward from central depression, also some shorter, dark, semi-recumbent hairs.

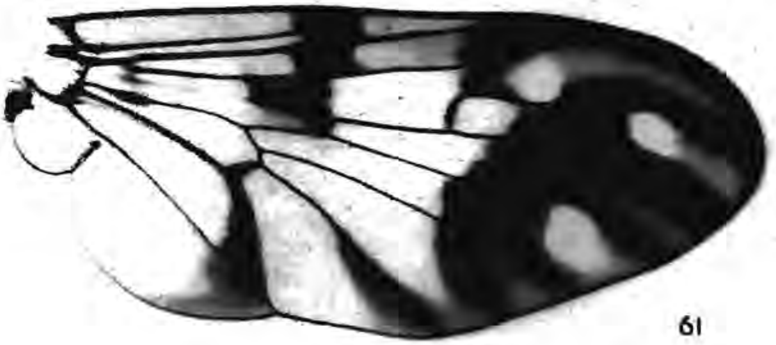
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Fig. 61: Wing of *Chrysopilus vadoni* n.sp. ♂.

Wing patterned as shown in fig. 61, membrane slightly yellow-tinged, distinctly yellowed in costal, subcostal and marginal cells, with a bold pattern in brown; an irregular fascia extends from apex of *Sc* to *r-m* and upper side of basal end of discal cell. Stigma dark brown, not quite filling apex of cell which is infuscated, apex of subcostal cell also browned. First submarginal cell smoky-brown up to base of R_4, with a curving, somewhat

tapering, paler median streak and a subcircular, whitish-hyaline spot beneath distal end of stigma; second submarginal cell smoky-brown except for basal fifth, the brown area enclosing a whitish-hyaline, suborbicular, disto-median spot beyond which is an enclosed paler brown area. First posterior cell smoky-brown up to base of second posterior cell, a median strip slightly paler; second posterior cell smoky brown up to basal apex, enclosing a whitish-hyaline spot larger than the other two already described, its outer edge not sharply defined but grading into a pale brownish area; third posterior cell smoky-brown, slightly paler medially, the brown extending a little into apex of discal cell; fourth posterior cell mainly hyaline, marked with brown as shown in fig. 61; fifth posterior cell with a brown mark tapering basad along apical half of M_4; a brownish infuscation along *m-cu*, extending from there along *An* (more broadly in anal cell), continuing into corner of axillary lobe and then quickly fading out along posterior edge. R_1 ending far from apex of *Sc*, about midway between *Sc* and apex of wing. R_{2+3} slightly undulant along its length, narrowing the marginal cell gradually over substigmal portion, ending on costa about length, or a little more, of *r-m*. R_4 strongly sinuous, curving beneath spot in first sub-marginal cell, and above spot in second submarginal cell. R_5 arched. Discal cell elongate; M_3 index 1·61.
Body length, 10·0 mm.
Wing size, 7·0 x 3·3 mm.
♀. Head relatively wide, index 1·25 (fig. 59). Eyes curving around on sides, occiput somewhat restricted. Frons narrow, index 4·62, slightly biconcave, dark purplish-brown, a dull silvery-grey pruinose mark against orbit above each antennae, and poorly-defined, dull greyish borders along eye margins elsewhere. Vertex distinctly sunken, ocellar tubercle not visible in lateral view, tubercle dark blackish-brown, ocelli large and close together in equilateral triangle. Antennae brownish-yellow, third segment slightly darker than others. Face dark brown in ground colour, with irregular yellowish-brown pruinescence. Palp brownish with darkened tip, somewhat flattened laterally, slightly wider apically. Mouthparts brownish. Hairs on lower occiput pale yellowish and pale brownish. Occiput grey, upper part with an extension of dark purplish-brown from frons.

Mesonotum without well-defined pattern of ♂, though basically similar; a dark brown median vitta present, widening in posterior half of mesonotum, bordered by broad, paler brown, sublateral stripes and small, yellow-brown marks about upper ends of transverse sutures; notopleuron narrowly bordered above with blackish-brown, the upper edge of this mark being continuous with a much wider blackish-brown postsutural mark. Humeri dull whitish; notopleura similar but with silvery-yellow pruinescence and silvery-white recumbent hairs. Median vitta of mesonotum extends onto scutellum which has only basal corners concolorous with sublateral stripes. Mesonotum largely rubbed but some remaining hairs give an idea of original appearance; the dark median vitta has some very small, dark recumbent hairs giving weak reddish reflections in certain positions; the sublateral stripes (also on scutellum) have larger, shining silvery-white hairs preserved in patches. Pleura as in ♂. All coxae dark brown; anterior femora dull brownish-yellow, knees palely yellowed; remaining femora brownish.

First abdominal tergite mostly dark brown with concolorous recumbent hairs, dull whitish-yellow with long, silvery-white recumbent hairs postero-laterally. Second tergite bare and pale, translucent brownish-yellow on basal quarter, on hind margins at sides narrowly dull yellow-brown with some silvery hairs, elsewhere dark brownish with numerous small, dark recumbent hairs. Third and fourth tergites dark brown, with some silvery hairs postero-laterally and small, dark recumbent hairs elsewhere, third tergite with weak yellowish tinge in hind margin except medially. Retracted segments sepia-brown. Second sternite concolorous with pale anterior part of second tergite; remaining sternites dark brown.

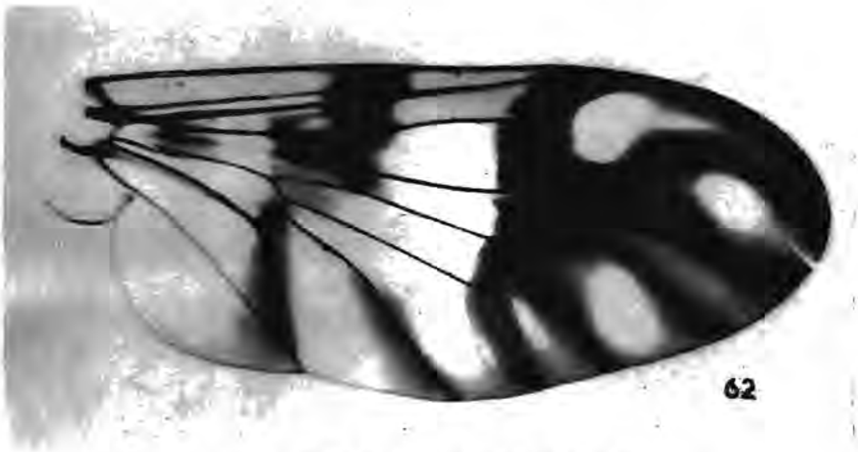

Fig. 62: Wing of *Chrysopilus vadoni* n.sp. ♀.

Wing (fig. 62) largely similar to that of ♂ but with some differences. There is a poorly defined brownish mark in first basal cell below base of prefurca (very faintly indicated in ♂). The brownish fascia which starts at end of *Sc* continues across basal quarter of discal cell and unites with brown mark in base of fifth posterior cell and along *An*, thus completing a fascia right across wing. Submarginal and posterior cells brown much as in ♂, but the whitish-hyaline spots are relatively much larger, the one in first submarginal cell closely approaching R_{2+3} and R_4 and having an adjoining elongate-subtriangular pale mark on distal side; in left wing there is a small elongate-ovoid pale mark basad of the large fenestra; fourth posterior cell with a large, elongate-oval, whitish-hyaline spot medially, and fifth posterior cell with a similar but smaller spot in brown area bordering apical section of M_3. R_4 angled at base, its basal section departing at a right-angle from R_5. M_3 index 1·95. Wing size, 7·3 x 2·4 mm.

Holotype ♂, paratype ♀, Ambohitsitondroina, Mahalevona District, north-east Madagascar, December 1949 (J. Vadon); teneral paratype ♀, Marojejy-Ouest, Sambava District, R.N.XII, November 1959, 1600 m. (P. Soga).

Notes: The type locality is in a montane area with magnificent rain-forest, at the base of the peninsula forming the eastern side of Antongil Bay. I have much pleasure in naming this fine species in honour of the distinguished Coleopterist and collector, Mr. J. Vadon of Maroantsetra.

REFERENCES

BRUNETTI, E., 1909. Revision of the Oriental Leptidae. *Rec. Ind. Mus.* **2:** 417-436, figs. 1-14 on pl. 12.

——— 1920. Fauna of British India. Diptera Brachycera. I. ix + 401 pp., 4 pls. *London.*

FREY, R., 1918. Beitrag zur Kenntnis der Dipterenfauna des nordl. europaischen Russlands. 2. Dipteren aus Archangelsk. *Acta Soc. Fauna et Flora Fenn.* **46** (2): 1-32.

——— 1954. Studien uber ostasiatische Dipteren. III. Rhachiceridae, Rhagionidae, Hilarimorphidae. *Notul. Ent.* **34:** 1-25.

HARDY, D. E., 1949. The North American Chrysopilus. *Amer. midl. Nat.* **41** (1): 143-167, 15 figs.

LEONARD, M. D., 1930. A revision of the dipterous family Rhagionidae (Leptidae) in the United States and Canada. *Mem. Amer. ent. Soc.* **7:** 181 + iv pp., 3 pls.

LINDNER, E., 1925. *Die Fliegen der Palaearktischen Region.* **20.** Rhagionidae. pp. 33-49, 4 figs.

MALAISE, R., 1945. Tenthredinoidea of south-eastern Asia. *Opusc. ent. Suppl.* **IV.** 288 pp., 20 pls., 57 figs.

MALLOCH, J. R., 1932. Notes on Exotic Diptera (1). *Stylops* **1** (5): 112-120, 3 figs.

NAGATOMI, A., 1958. Studies in the Aquatic Snipe Flies of Japan. Part I. Descriptions of the adult. *Mushi* **32** (5): 45-67, 21 figs.

——— 1960. Part II. Descriptions of the eggs. *Ibid.* **33** (1): 1-3, 6 figs.

——— 1961a. Part III. Descriptions of the larvae. *Ibid.* **35** (3): 11-27, 8 figs.

——— 1961b. Part IV. Descriptions of the pupae. *Ibid.* **35** (4): 29-38, 12 figs.

——— 1962. Part V. Biological Notes. *Ibid.* **36** (10): 103-149, 23 figs.

——— 1964. *Atherix* (*Heterosuragina*) Nagatomi, a new synonym of *Atherix* (*Atrichops*) Verrall. *Kontyu* **32** (1): 69.

PARAMONOV, S. J., 1962. A review of the Australian Leptidae. *Austr. J. Zool.* **10** (1): 113-169, figs.

SÉGUY, E., 1951. Description d'une nouvelle espece de Rhagionide de Madagascar. *Mem. Inst. sci. Madagas.* (A) **6** (2): 395-397, figs.

STUCKENBERG, B. R., 1960. Diptera Rhagionidae. *South African Animal Life* **7:** 216-308, 89 figs. *Uppsala.*

SZILÁDY, Z., 1934. Die palaearktischen Rhagioniden. *Ann. Mus. nat. hung.* **28:** 229-270, 5 figs.

VERRALL, G. H., 1909. British Flies. 5. Stratiomyidae and succeeding families. 780 pp. *London.*

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